

1906 San Francisco earthquake and fire.

- The 1906 San Francisco earthquake struck the coast of Northern California at 5:12 a.m. on Wednesday, April 18th .
- The death toll from the earthquake and resulting fire remains the greatest loss of life from a natural disaster in California's history.
- The coastal liner Columbia on her side at the Union Iron Works dry dock.



Severity of the earthquake.

- The Richter magnitude scale was not invented until 1935 thus the scale of the San Francisco earthquake can only be guestimates.
- These give it a value between 7.7 to and 8.25.

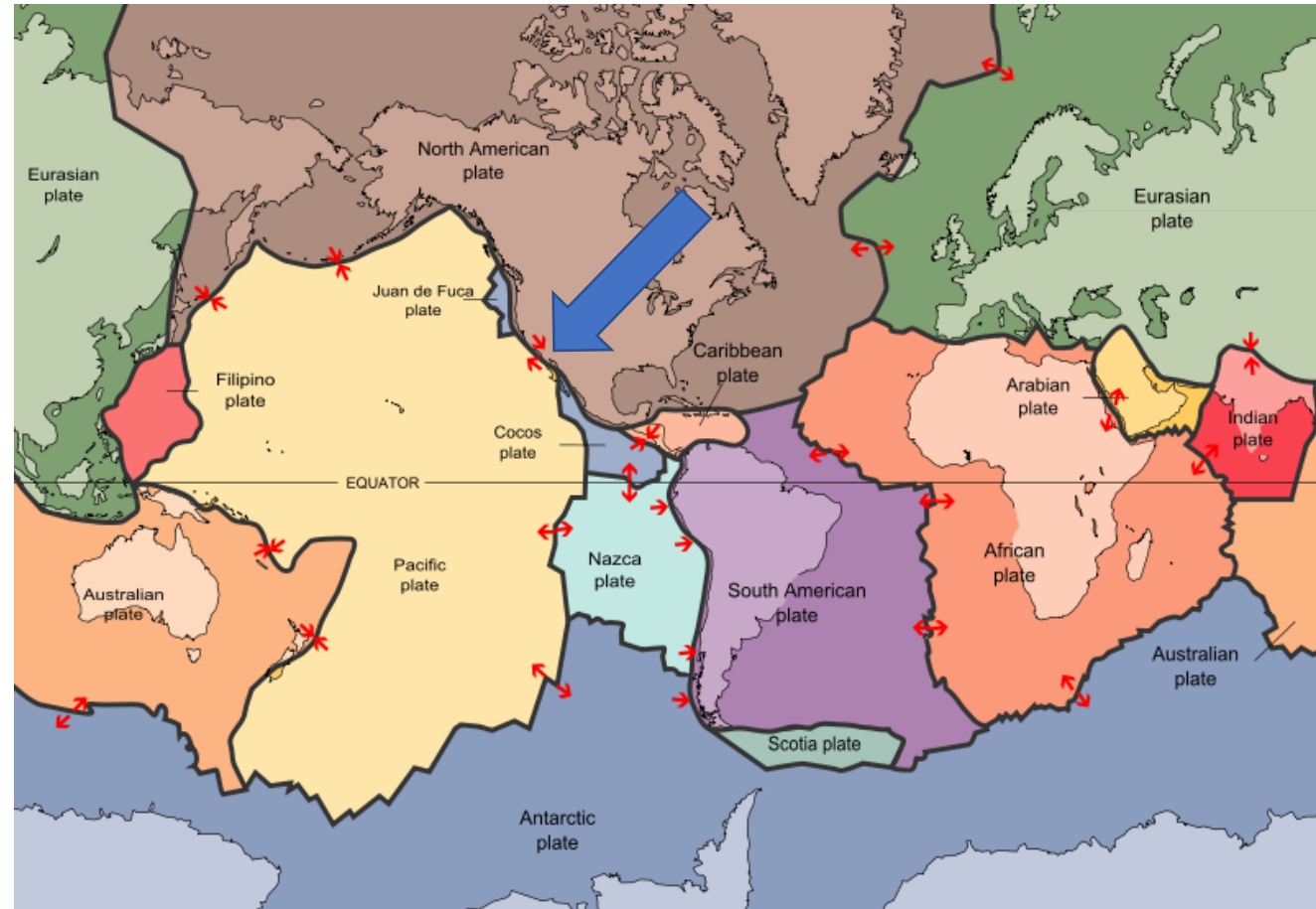
- Charles Richter, c. 1970.

- The scale involves logarithms.



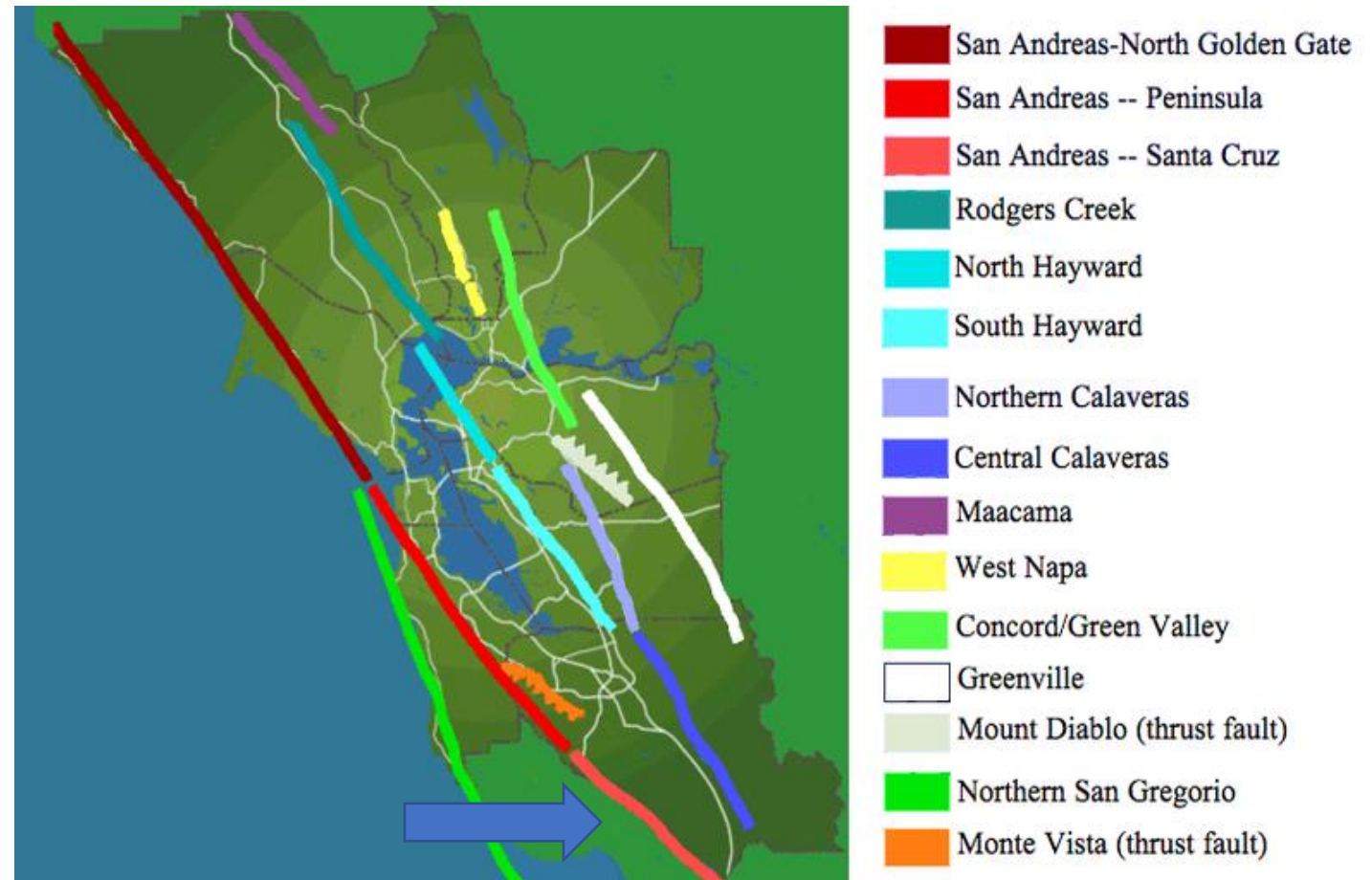
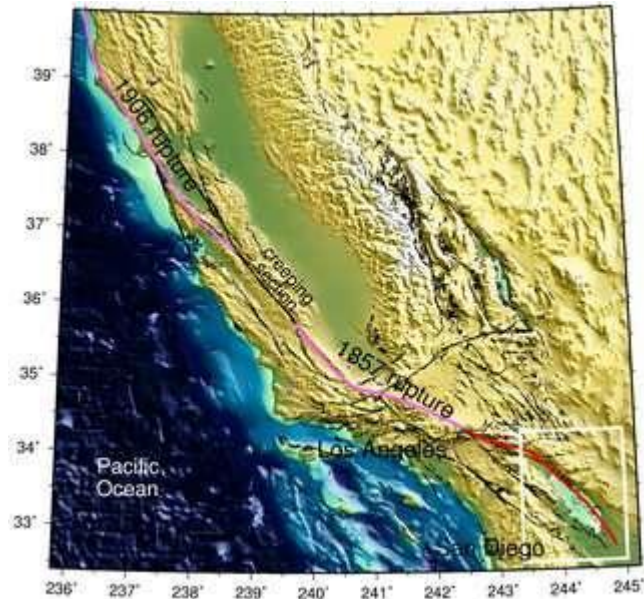
Movement of the tectonic plates caused the earthquake.

- The San Andreas Fault is the tectonic boundary between the Pacific Plate and the North American Plate.
- The 1906 rupture propagated both northward and southward for a total of 476 km.
- The total length of the fault is about 1,300 km.



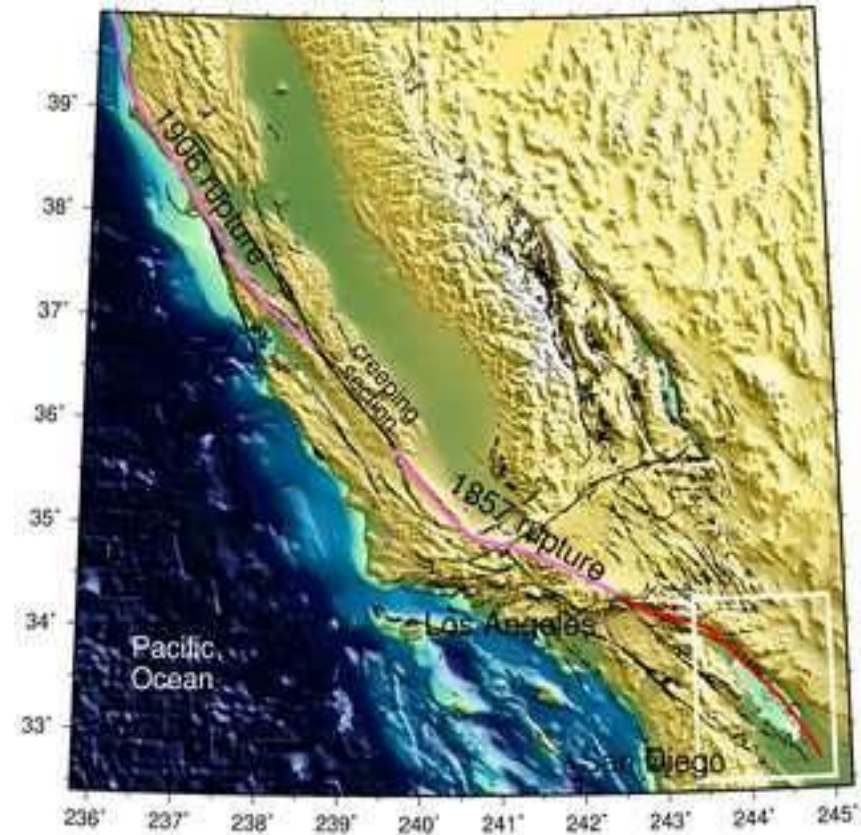
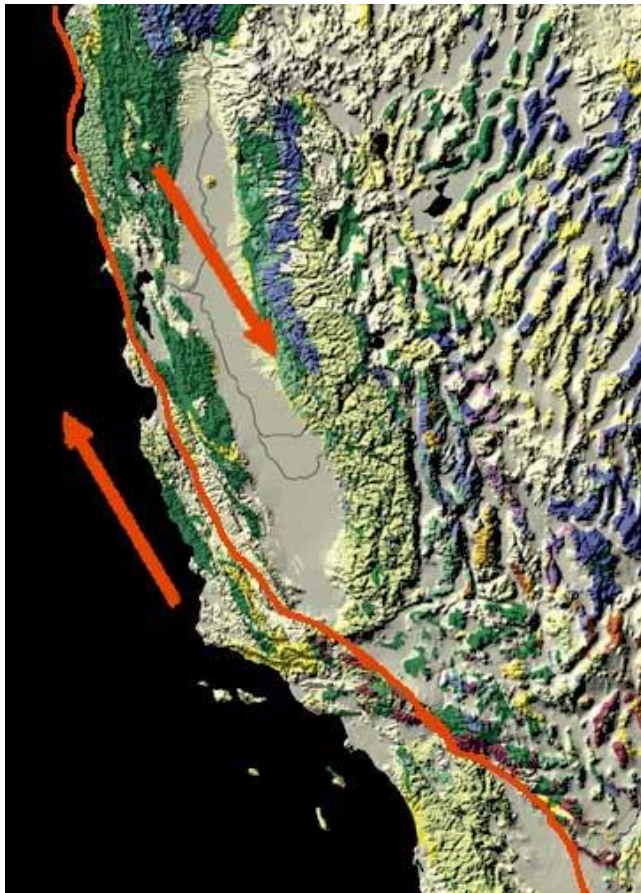
Many faults in California.

- The fault divides into 3 segments, each with a different earthquake risk, the most significant (southern segment, passes within about 56km of Los Angeles).



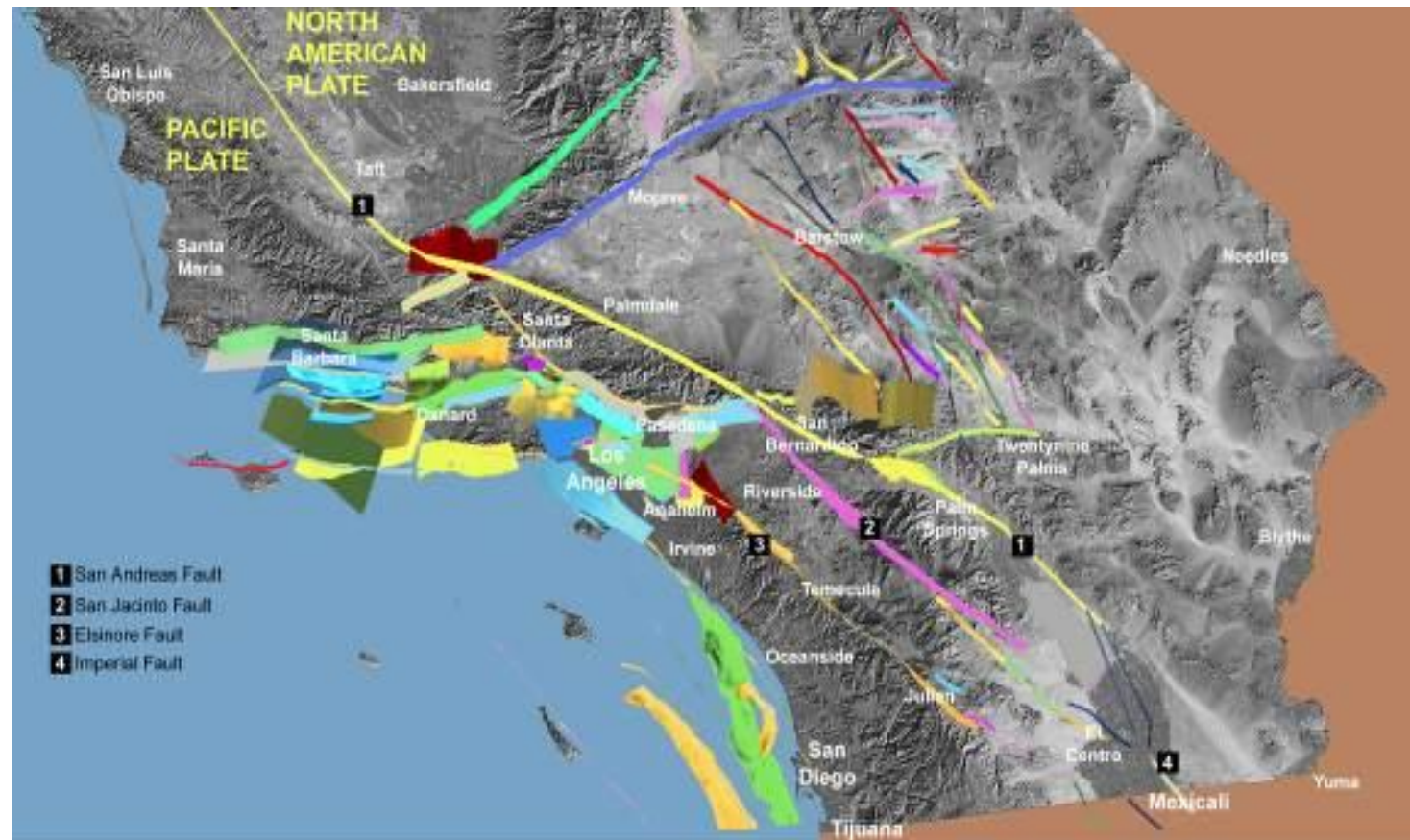
The plates are scraping each other, in places moving 50 mm per year

- Map of the San Andreas Fault, showing relative motion



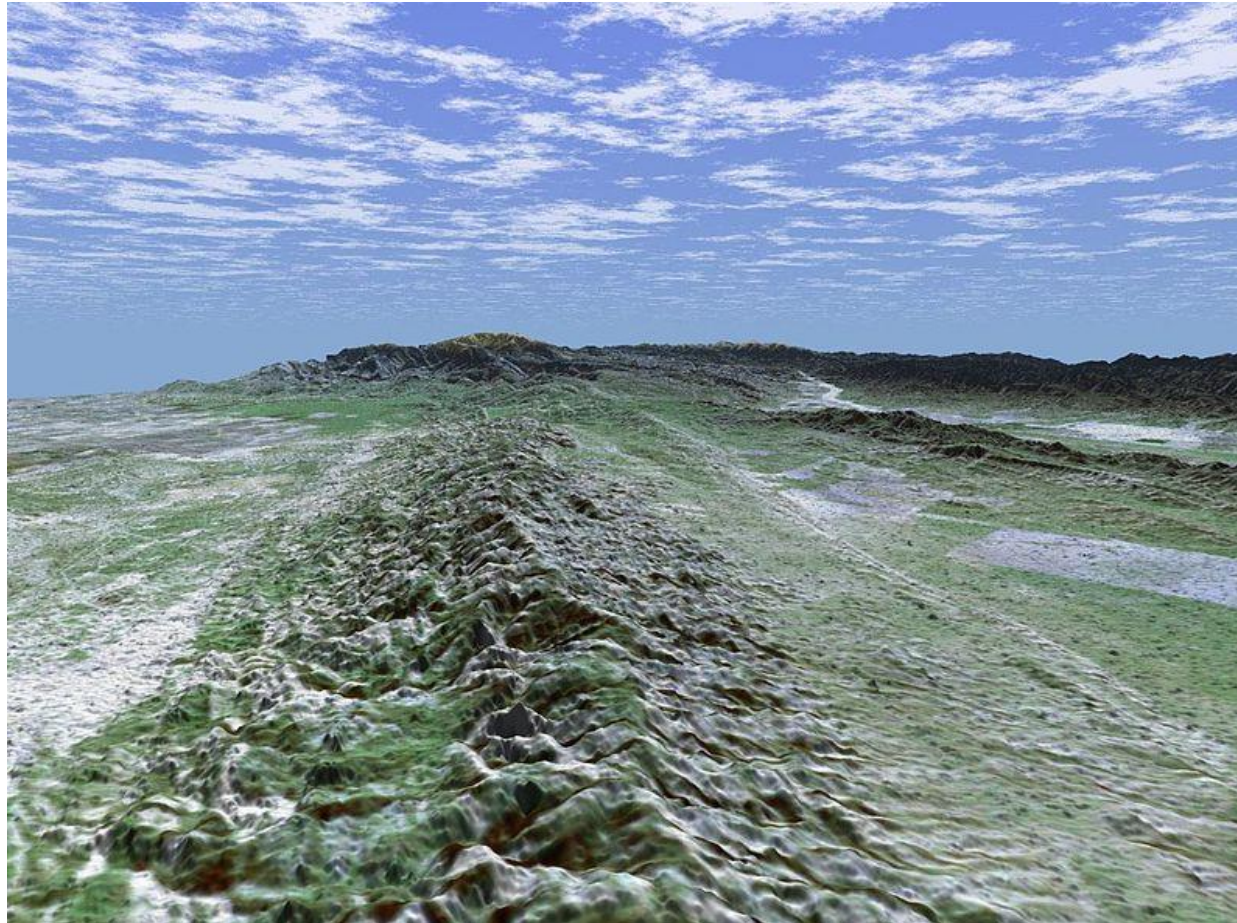
Four of the faults that cause earthquakes.

- Another illustration



3-D perspective view of the fault.

- Not sure where.



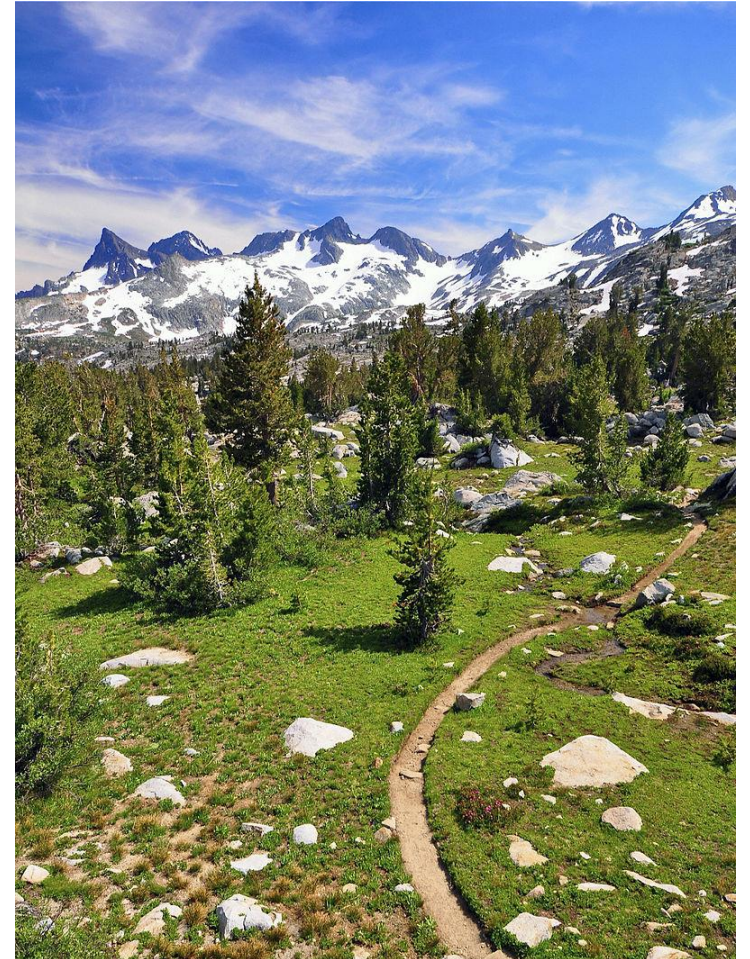
Vasquez Rocks in Agua Dulce, California

- They are evidence of the San Andreas Fault line and part of the 2,650 mile Pacific Crest Trail.



A scenic journey.

- The **Pacific Crest Trail** is a long-distance hiking and equestrian trail closely aligned with the highest portion of the Sierra Nevada and Cascade mountain ranges, which lie 160 to 240 km east of the U.S. Pacific coast.
- This photograph was taken between Rush Creek and Donahue Pass.



Epicentre was close enough to cause massive damage.

- The main shock epicentre probably occurred offshore about 3.2 km from the city, near Mussel Rock.
- Shaking was felt from Oregon to Los Angeles, and inland as far as central Nevada.



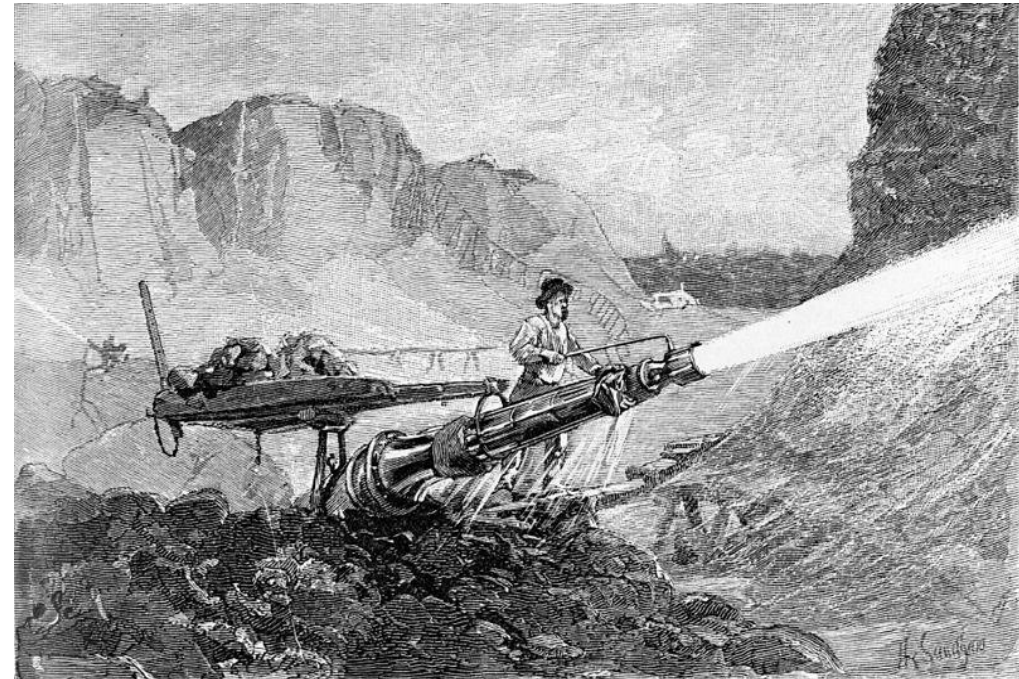
A number of shocks.

- An earthquake manifests as a series of shock waves. The largest of these is called the main shock.
- Any waves before it are called foreshocks and any afterwards are called aftershocks.
- A strong foreshock preceded the main shock by about 20 to 25 seconds.
- The strong shaking of the main shock lasted about 42 seconds.



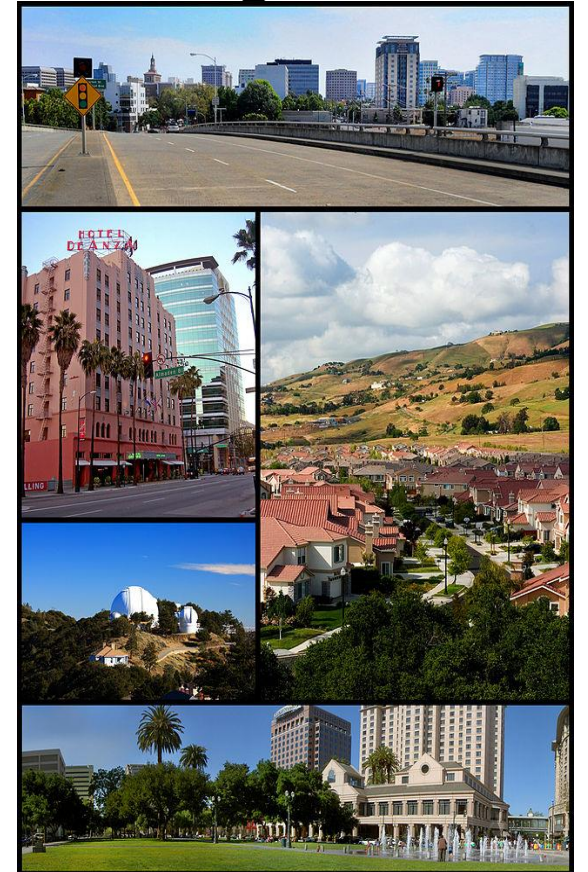
Man-caused minor quakes.

- There were decades of minor earthquakes – more than at any other time in the historical record for northern California – before the 1906 quake.
- One suggestion is that they were caused by large seasonal sediment loads, in coastal bays that overlie faults, as a result of the erosion caused by hydraulic mining in the later years of the California Gold Rush.



Damage in other cities.

- Although the impact of the earthquake on San Francisco was the most famous, the earthquake also inflicted considerable damage on several other cities.
- These include San Jose and Santa Rosa, the entire downtown of which was essentially destroyed.
- Images, from top down, left to right:
- Downtown San Jose, Hotel De Anza, East San Jose suburbs, Lick Observatory, Plaza de César Chávez.
- San Jose is now California's 3rd largest city.



Fires were by far more damaging than the actual earthquake.

- As damaging as the earthquake was, the fires that burned out of control afterward were even more destructive.
- It has been estimated that up to 90% of the total destruction was the result of the subsequent fires.



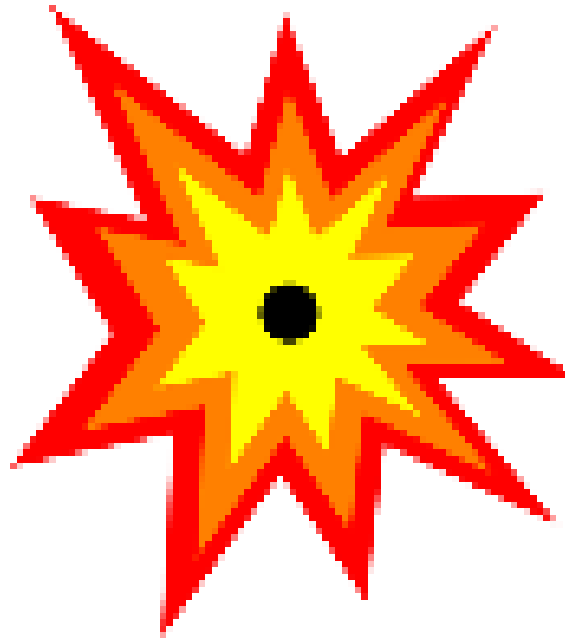
A costly meal.

- Within three days, over 30 fires, caused by ruptured gas mains, destroyed approximately 25,000 buildings on 490 city blocks.
- One of the largest of these fires was accidentally started in a house on Hayes Street by a woman making breakfast for her family.
- This came to be known as the "Ham and Eggs Fire".



A good idea gone wrong.

- Some were started when firefighters, untrained in the use of dynamite, attempted to demolish buildings to create firebreaks.
- The dynamited buildings themselves often caught fire.



Insurer's firm line.

- In all, the fires burned for four days and nights.
- Due to a widespread practice by insurers to indemnify San Francisco properties from fire, but not earthquake damage, most of the destruction in the city was blamed on the fires



Some fires were deliberately lit.

- Some property owners deliberately set fire to damaged properties, in order to claim them on their insurance.
- Capt. Leonard D. Wildman of the U.S. Army Signal Corps reported that he "was stopped by a fireman who told me that people in that neighbourhood were firing their houses...they were told that they would not get their insurance on buildings damaged by the earthquake unless they were damaged by fire".



Effect on the economy.

- The insurance payments heavily affected the international financial system.
- Gold transfers from European insurance companies to policyholders in San Francisco led to a rise in interest rates and subsequently to a lack of available loans.



Finally.

- If plate tectonics followed the laws of Hollywood physics, Los Angeles would be tearing violently from the mainland as we speak.
- The scenario would probably include a buxom seismologist and a secret nuclear warhead, too.
- But rest assured that, outside the movies, California Island won't be popping up on any maps.
- The Pacific plate is moving "**up**" **the coast**, not away from the North American plate, at a rate of about 50mmdozens per year.