

# 2026 Earthquake Risks

April 2, 2026  
Ken Foot KR6CO



# We will cover...

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1. The Big (earthquake) Picture
2. The situation in the U.S.
3. The situation in California
4. The situation in the SF Bay Area
5. The situation in Cupertino
6. Summary of Risks



# Some definitions

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## *def:* **Earthquake**

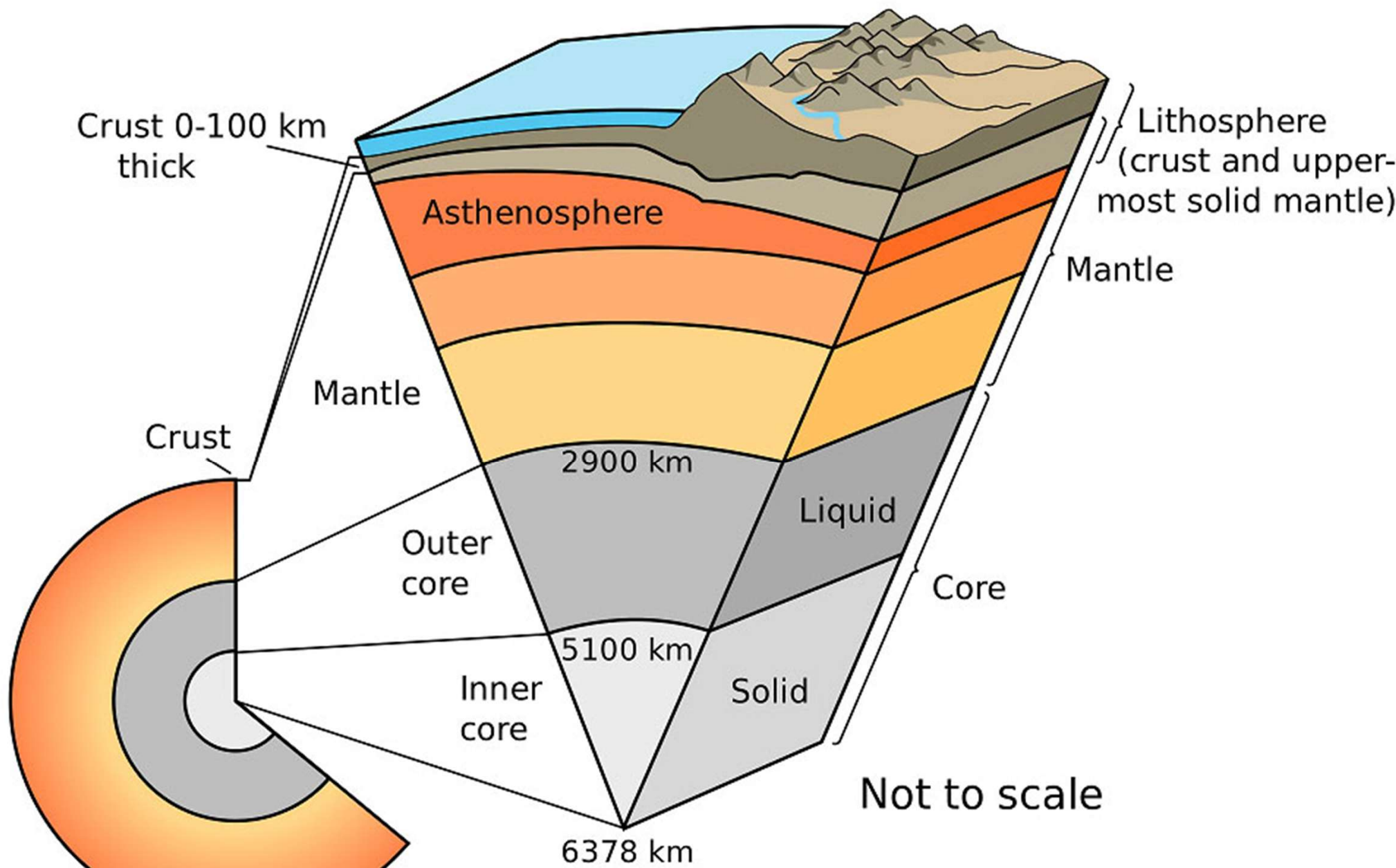
“...what happens when two blocks of the earth suddenly slip past one another.”  
--- *United States Geological Survey*

What causes this *slipping* to occur?

## *def:* **Plate Tectonics**

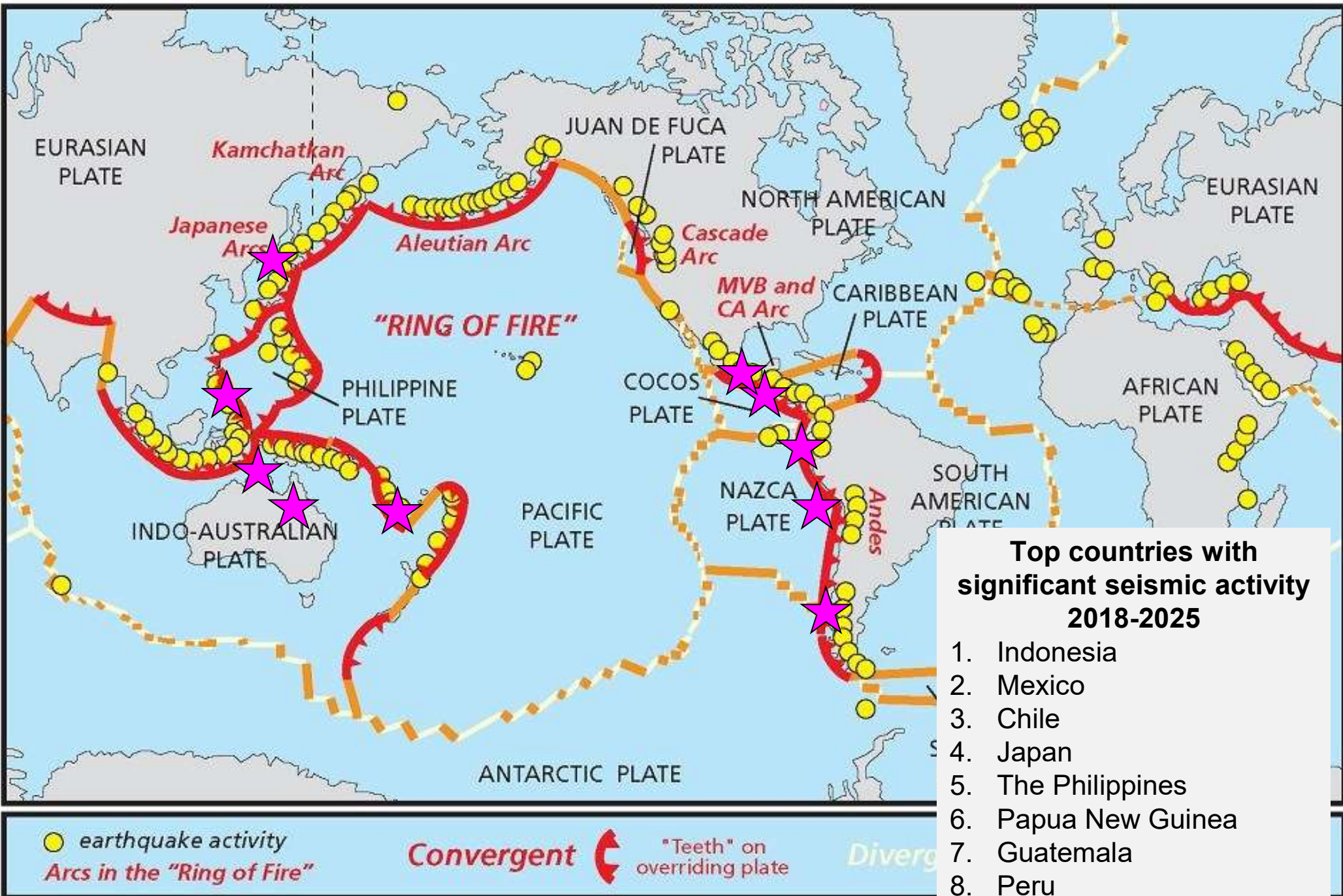
“... a scientific theory that explains how major landforms are created as a result of Earth's subterranean **movements**.”  
--- *National Geographic Society*













To scale

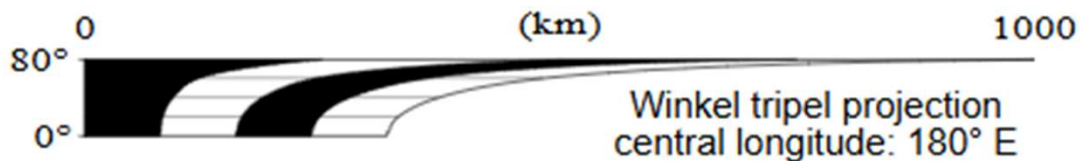
# All the action is at the edges



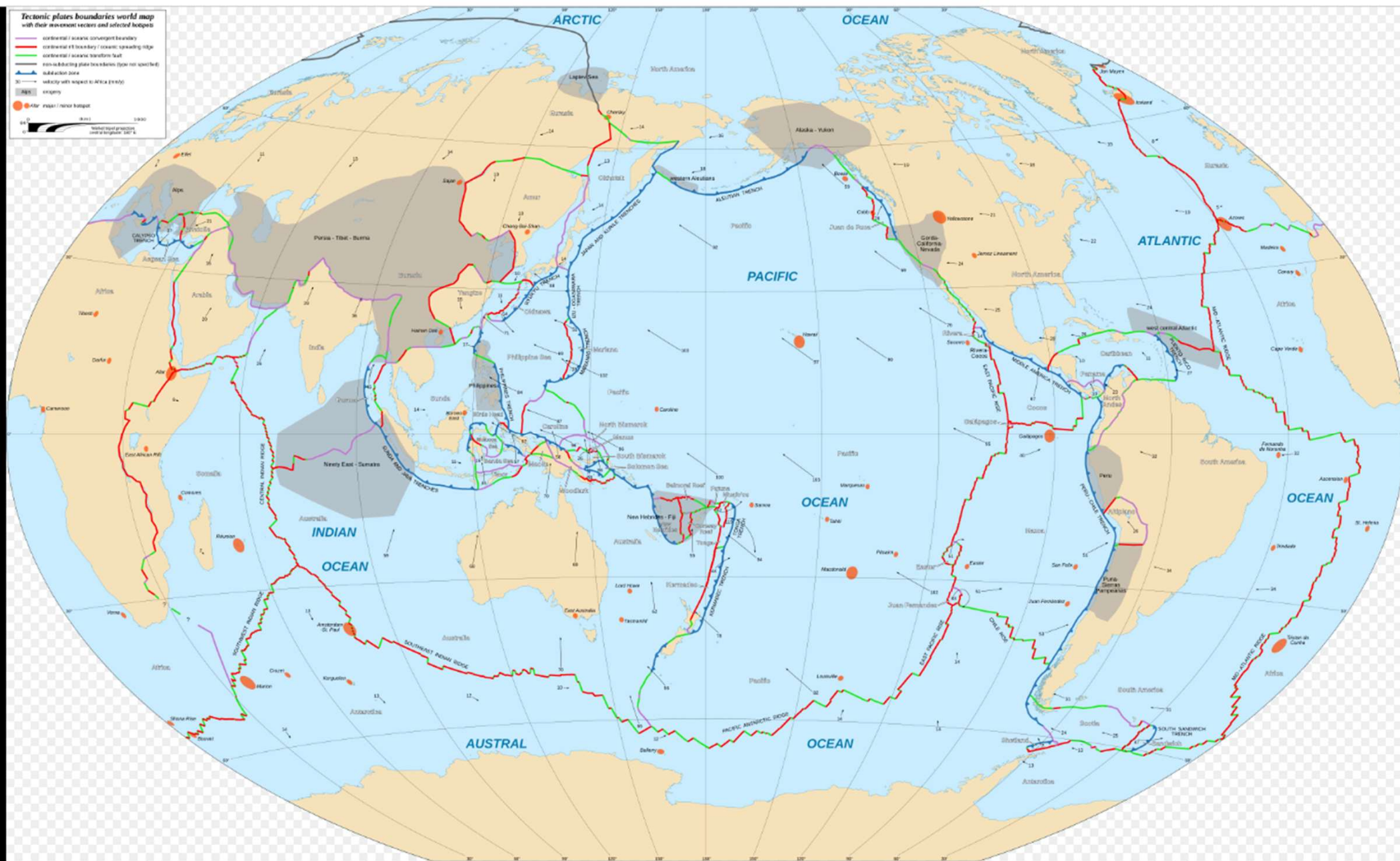
# What causes the movement?

## *Tectonic plates boundaries world map with their movement vectors and selected hotspots*

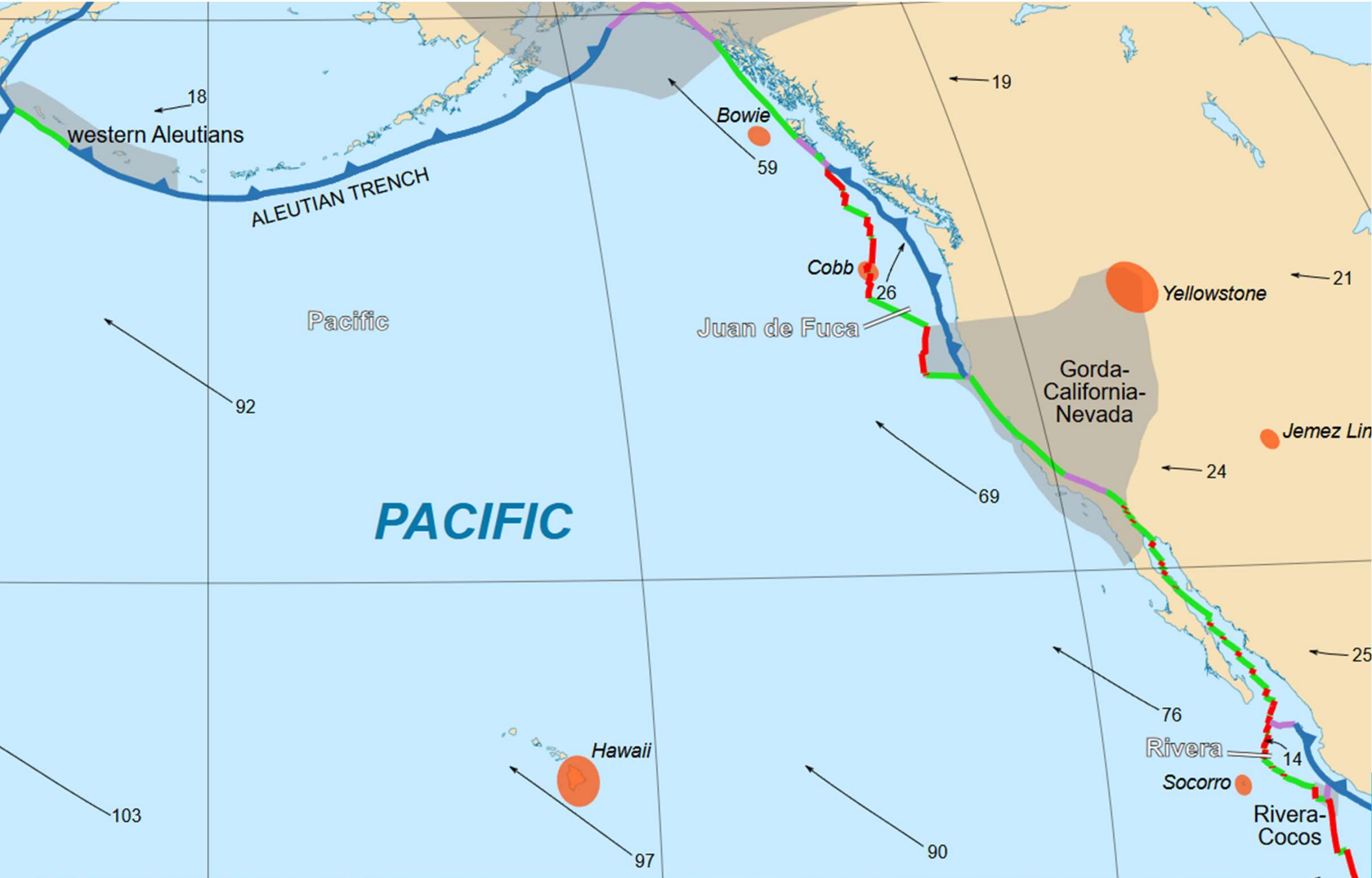
-  continental / oceanic convergent boundary
-  continental rift boundary / oceanic spreading ridge
-  continental / oceanic transform fault
-  non-subducting plate boundaries (type not specified)
-  subduction zone
- 30  velocity with respect to Africa (mm/y)
-  orogeny
-  *Afar* major / minor hotspot



# What causes the movement?



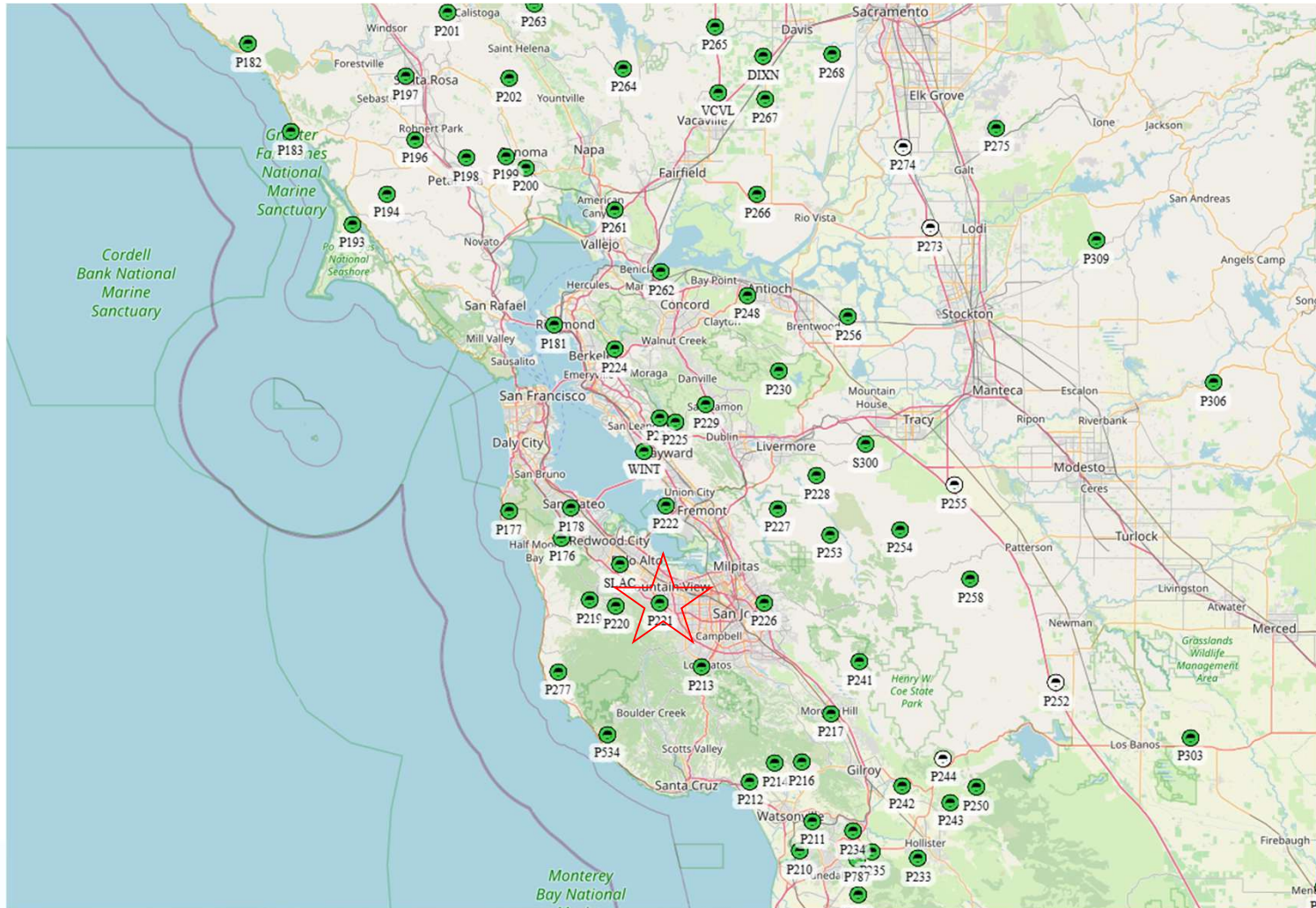
# What causes the movement?



# And yes, we are moving!

## Real-time GNSS/GPS network

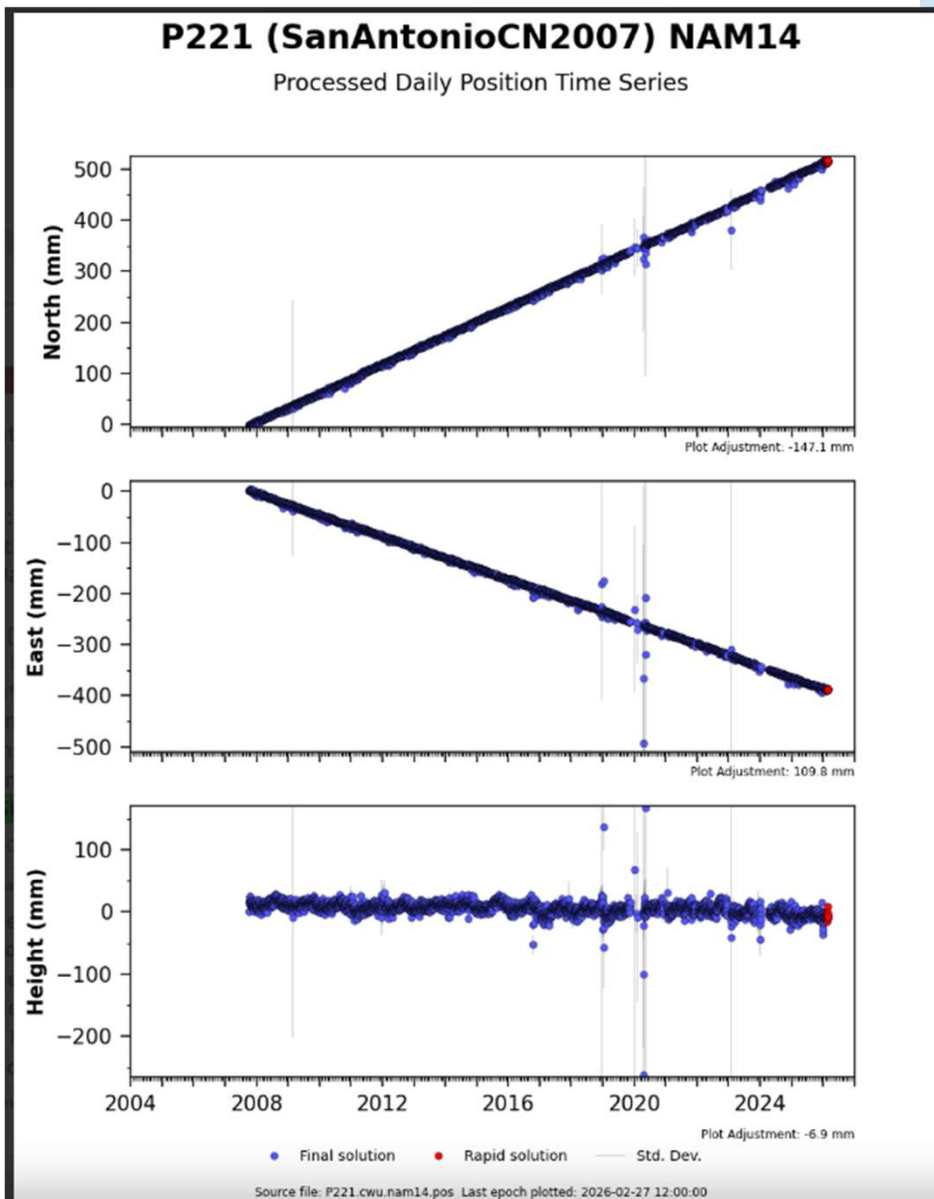
<https://www.unavco.org/instrumentation/networks/status/all/realtime>



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# P221 - Overview | Station Page



**Station Type: GPS**

**Station Information**

<b>4-Char ID:</b>	P221 - GPS
<b>Station Status:</b>	Installed / Operable
<b>Station Name:</b>	SanAntonioCN2007
<b>Project:</b>	PBO
<b>Location (City, State):</b>	Los Altos, CA
<b>Latitude, Longitude*:</b>	37.33695, -122.09903
<b>Elevation*:</b>	155.828 m
<b>Monument Type:</b>	DEEP-DRILLED BRACED
<b>Station Install Date:</b>	2007/10/09
<b>Monument Install Date:</b>	2007/10/09
<b>Current Status:</b>	<b>OK</b>

\*GPS receiver values - not precise

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# The situation in the U.S.



# What's the Situation in the U.S.?

## Earthquake likelihood?

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Best Reference:

[USGS National Seismic Hazard Model \(2023\) - Chance of Damaging Earthquake Shaking](#)

- A map displaying the likelihood of damaging earthquake shaking in the United States over the next 100 years, and
- is applied in seismic provisions of building codes, insurance rate structures, risk assessments, and other public policy.
- Defines the potential for earthquake ground shaking for various probability levels across the United States including Alaska, and Hawaii.

**Source:** <https://www.usgs.gov/media/images/national-seismic-hazard-model-2023-chance-damaging-earthquake-shaking>

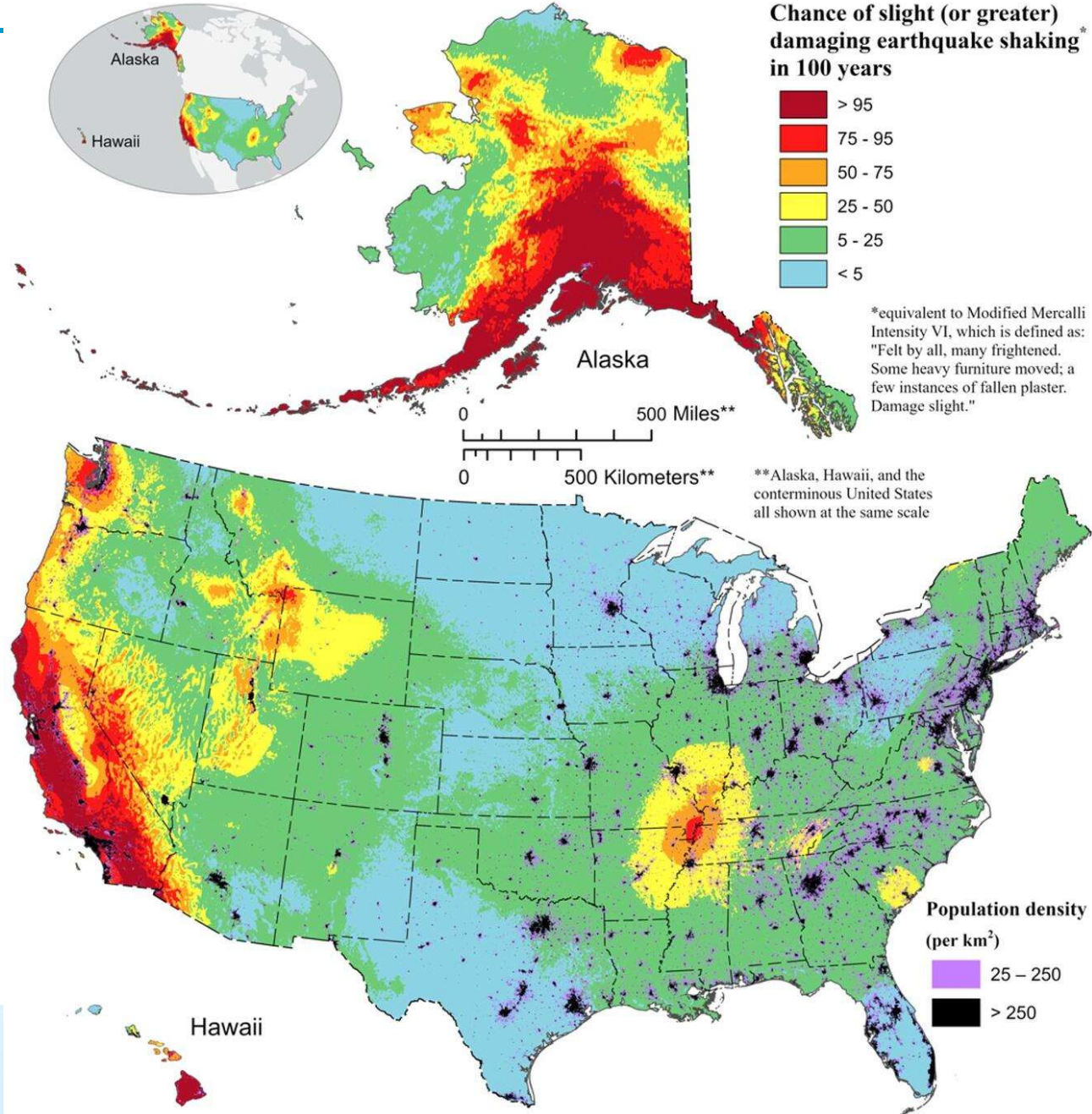


# What's the Situation in the U.S.?

## In the 2023 USGS study

### Key findings from study

1. Nearly 75% of U.S. could experience damaging earthquakes
2. 37 states have had magnitude 5 or greater quakes in last 200 years



# Recent NJ Earthquake?

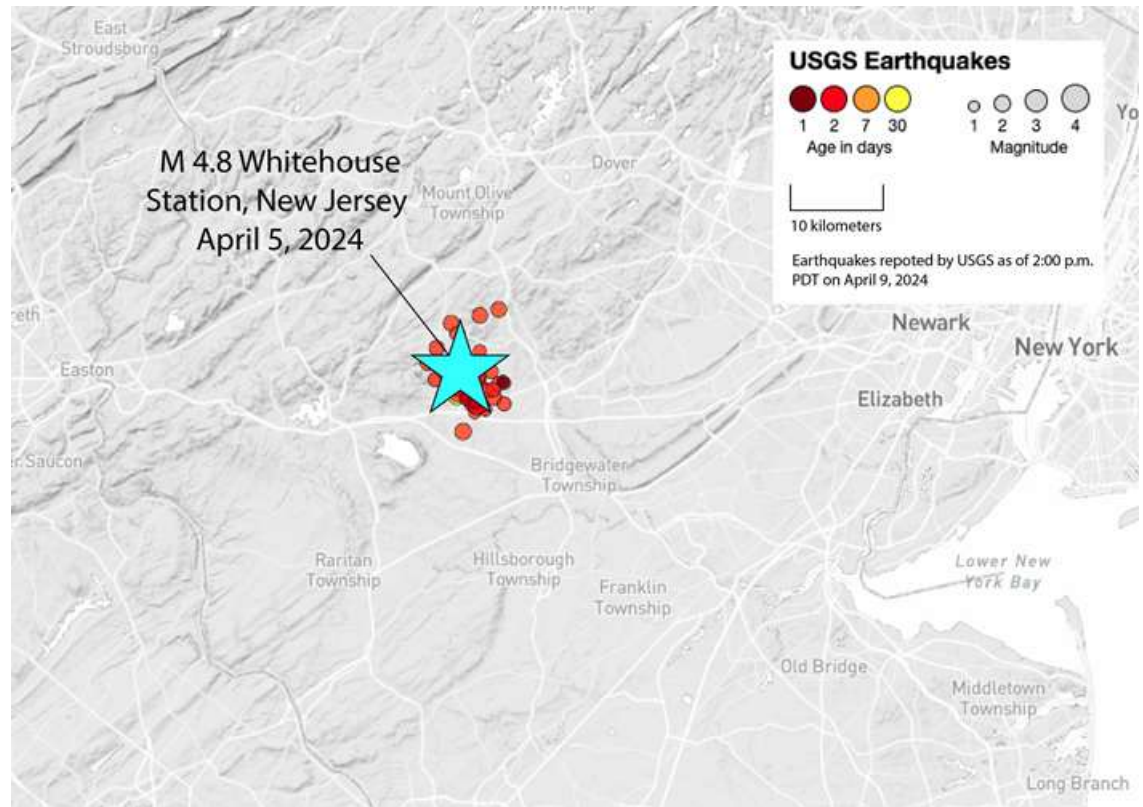
FYI... An interesting read

## Magnitude 4.8 earthquake shakes the U.S. East Coast

April 5, 2024

<https://temblor.net/temblor/april-2024-earthquake-shakes-u-s-east-coast-16079/>

In California, a magnitude 4.8 earthquake might not be felt across state borders or even in the next big city. In contrast, earthquakes along the East Coast tend to be felt more widely because the bedrock is stronger and older, says Judith Hubbard, a geologist at Cornell University and co-author of Earthquake Insights. Bedrock can transmit seismic energy more efficiently, leading to a wider area in which people experience the earthquake.

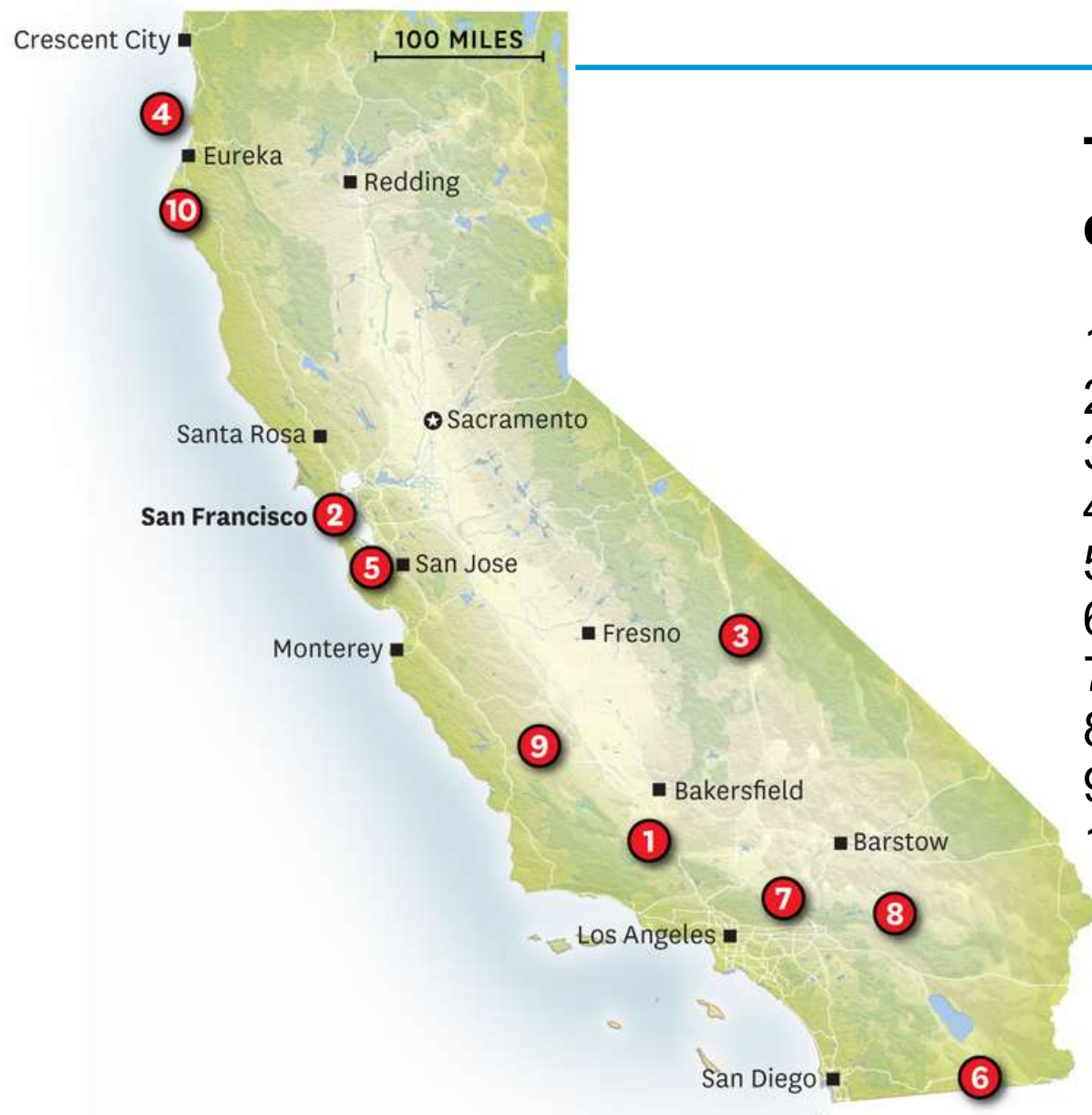


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# The situation in California



# The situation in California



## Top 10 biggest CA earthquakes since 1800

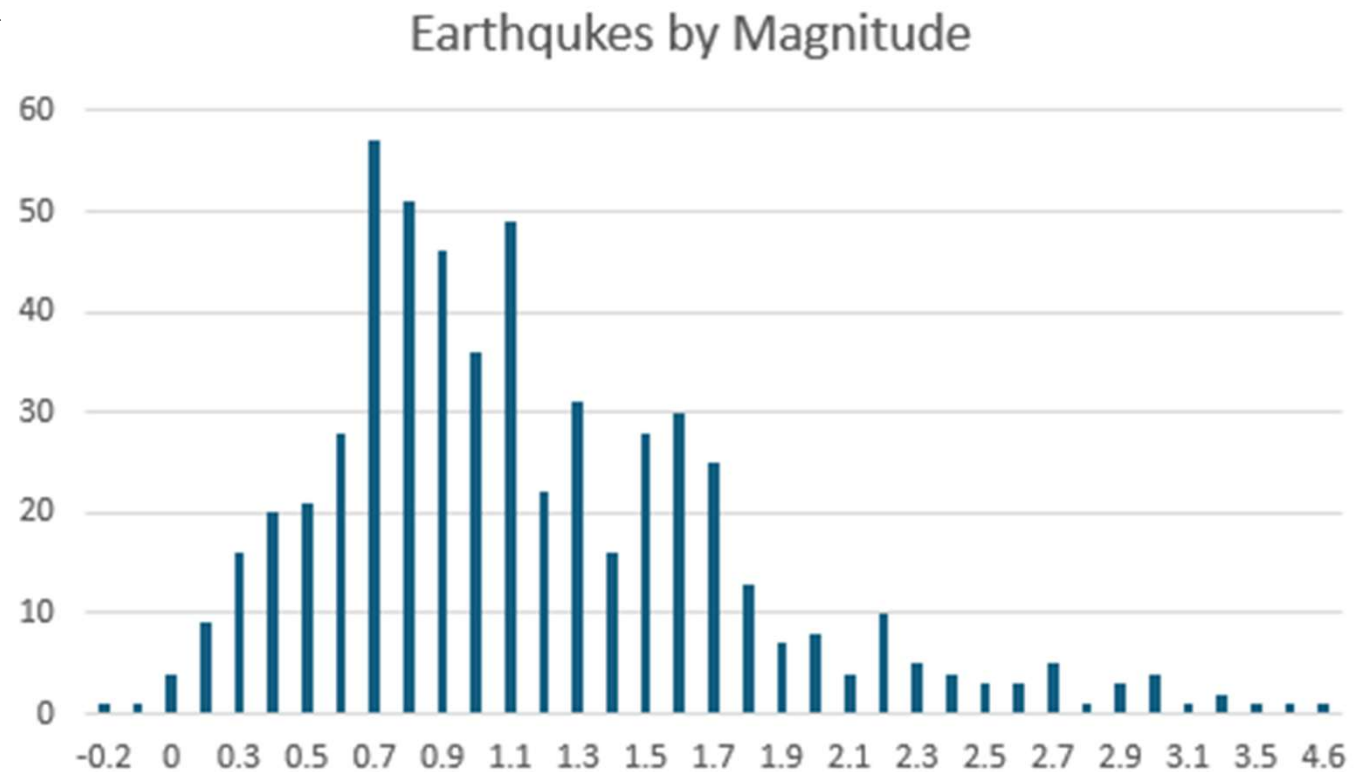
1. Fort Tejon, 1857, 7.9
2. San Francisco, 1906, 7.9
3. Owens Valley, 1872, 7.8
4. West of Eureka, 1980, 7.4
5. Santa Cruz Mountains, 1838, 7.4
6. Imperial Valley, 1892, 7.3
7. Wrightwood, 1812, 7.3
8. Landers, 1992, 7.3
9. Kern County, 1952, 7.3
10. Petrolia, 1992, 7.2

(Wondering about Loma Prieta?  
At 6.9, it didn't quite make the list.)



# The situation in California

- ***Southern California Earthquake Data Center*** reported over 550 earthquakes on the west coast over a one week period ending 7 April 2028.



Source: **Southern California Earthquake Data Center**

<https://scedc.caltech.edu/recent/Quakes/quakes0.htm>

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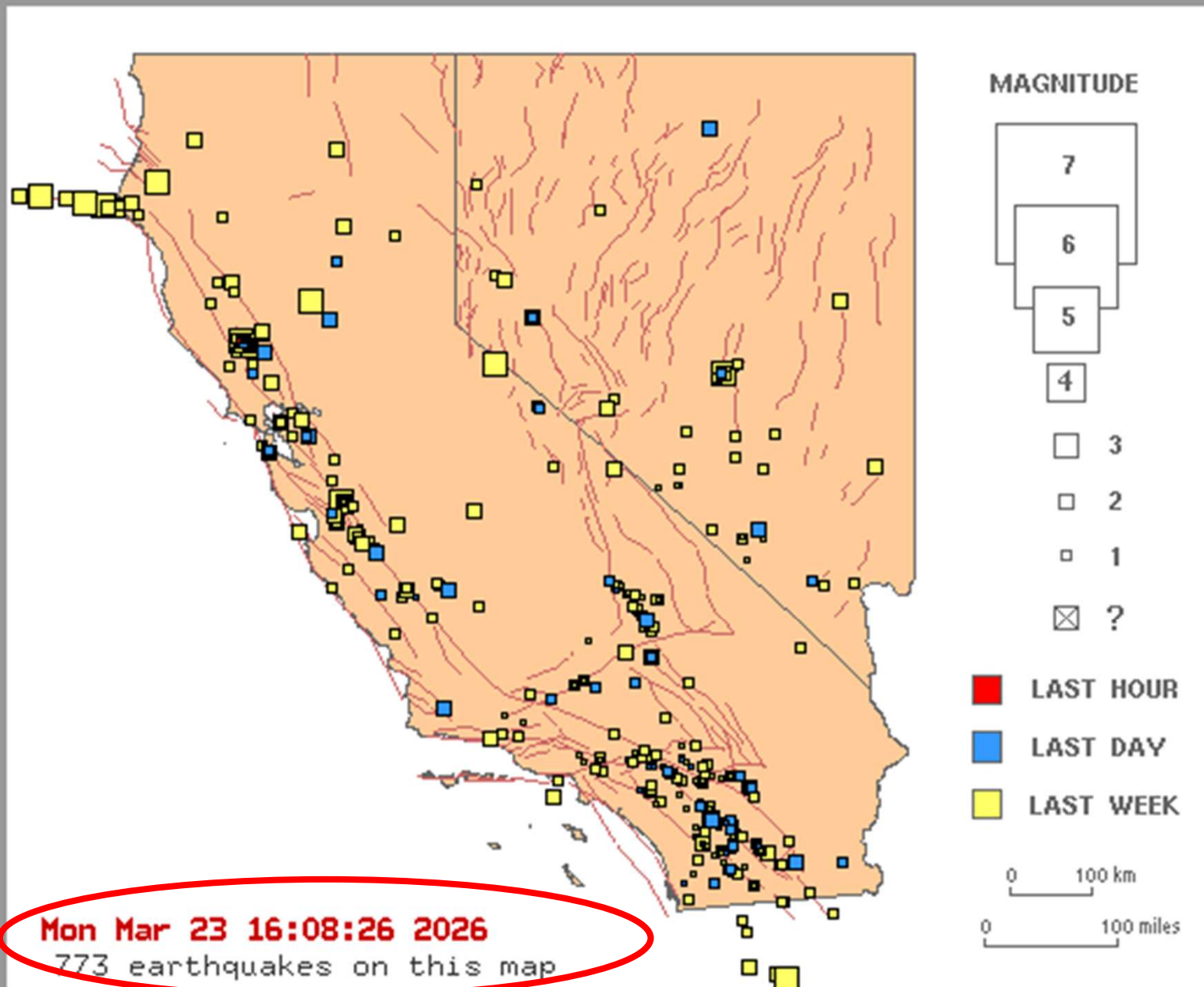


# Recent Earthquakes in CA and NV

<https://scedc.caltech.edu/recent/>

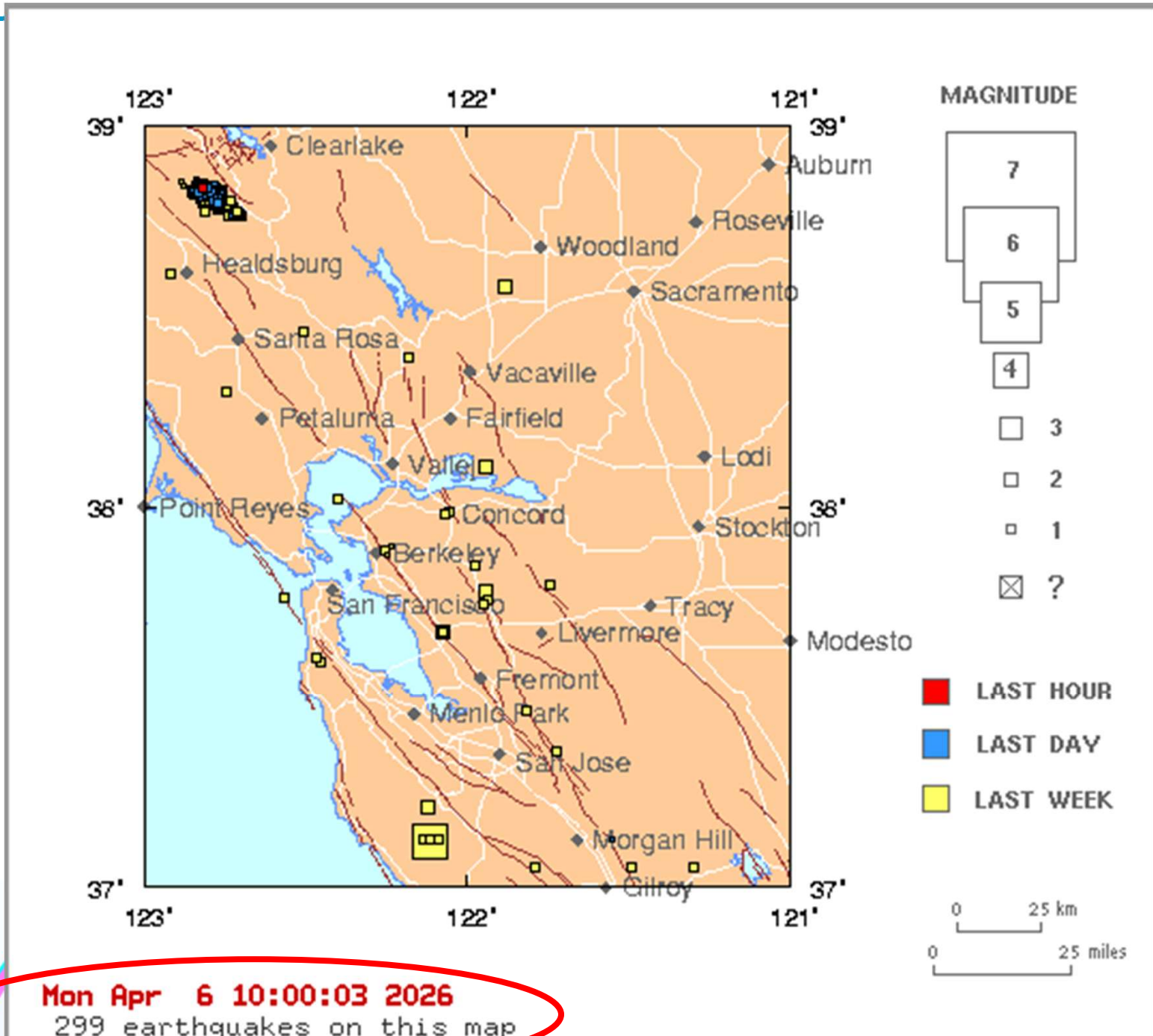
## Index Map of Recent Earthquakes in California-Nevada

USGS·UCB·Caltech·UNR



# Recent Earthquakes in CA and NV

<https://scedc.caltech.edu/recent/>



Mon Apr 6 10:00:03 2026

299 earthquakes on this map

ZUZO Earthquake Risks

# What is the risk of a California earthquake?

<https://www.scec.org/ucerf>

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The **Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3)** is a comprehensive model of earthquake occurrence for California.

According to the UCERF3 report, in the next 30 years (beginning 2014), there is:

1. More than 99% chance that one or more M6.7 or greater earthquakes will strike somewhere in California.
2. a 76% chance one or more M7.0 or greater earthquakes will strike Northern California.
3. a 75% chance one or more M7.0 or greater earthquakes will strike Southern California.

Source: **Southern California Earthquake Center**



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# The situation in the SF Bay Area



# The situation in the SF Bay Area

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## *def:* San Francisco Bay Area

Counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma

- The greater SF Bay Area has a high likelihood of future damaging earthquakes as it straddles the San Andreas fault system.
- The Calaveras and Hayward faults extend up the east side of the SF Bay. These and other major faults in the region are part of the San Andreas fault system.
- Scientists predict that within a 30-year period (beginning in 2014), there's a...
  - 98% chance of one or more magnitude-6.0 or greater quakes hitting the Bay Area in that same timeframe.



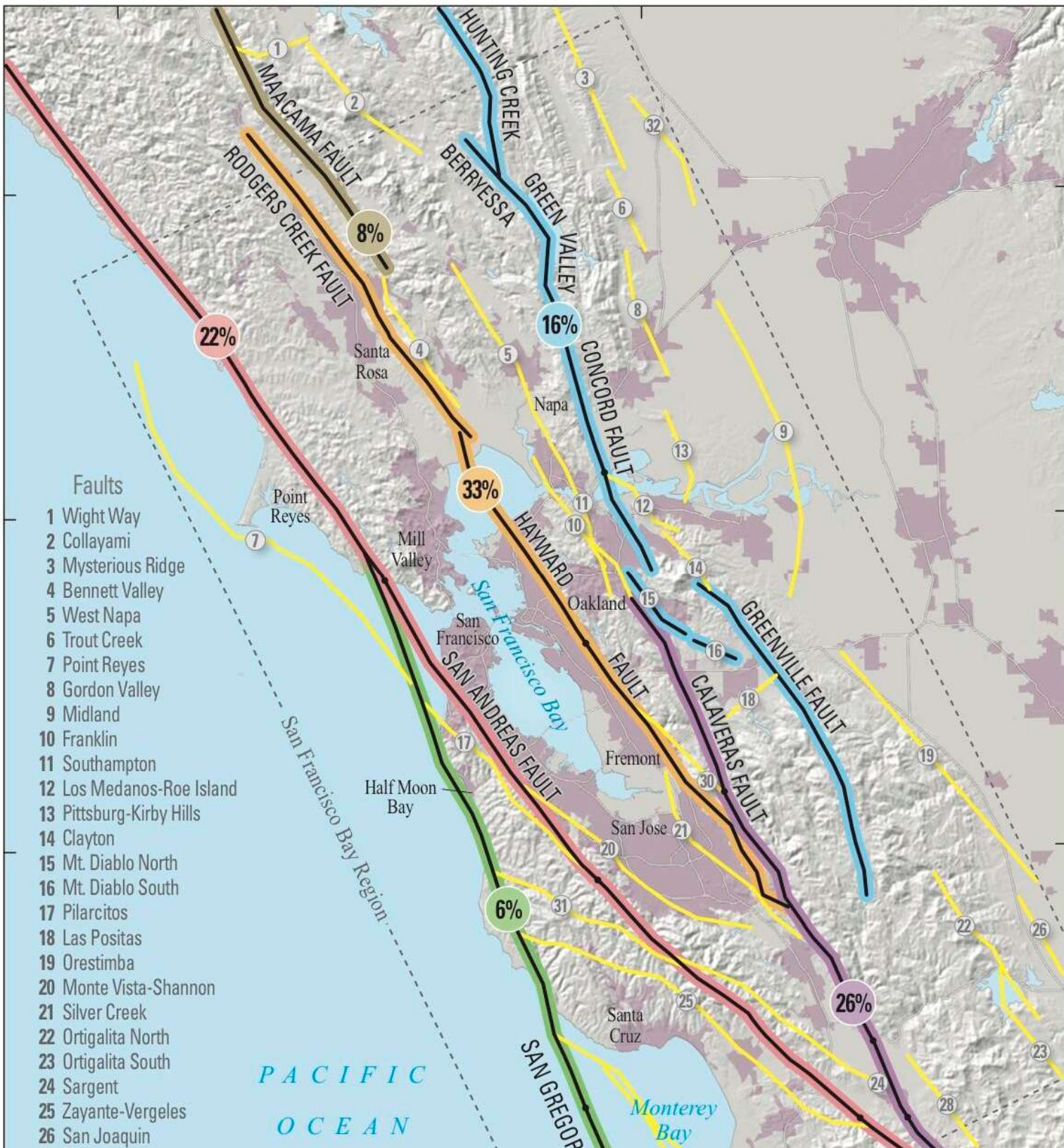
38°30'

38°

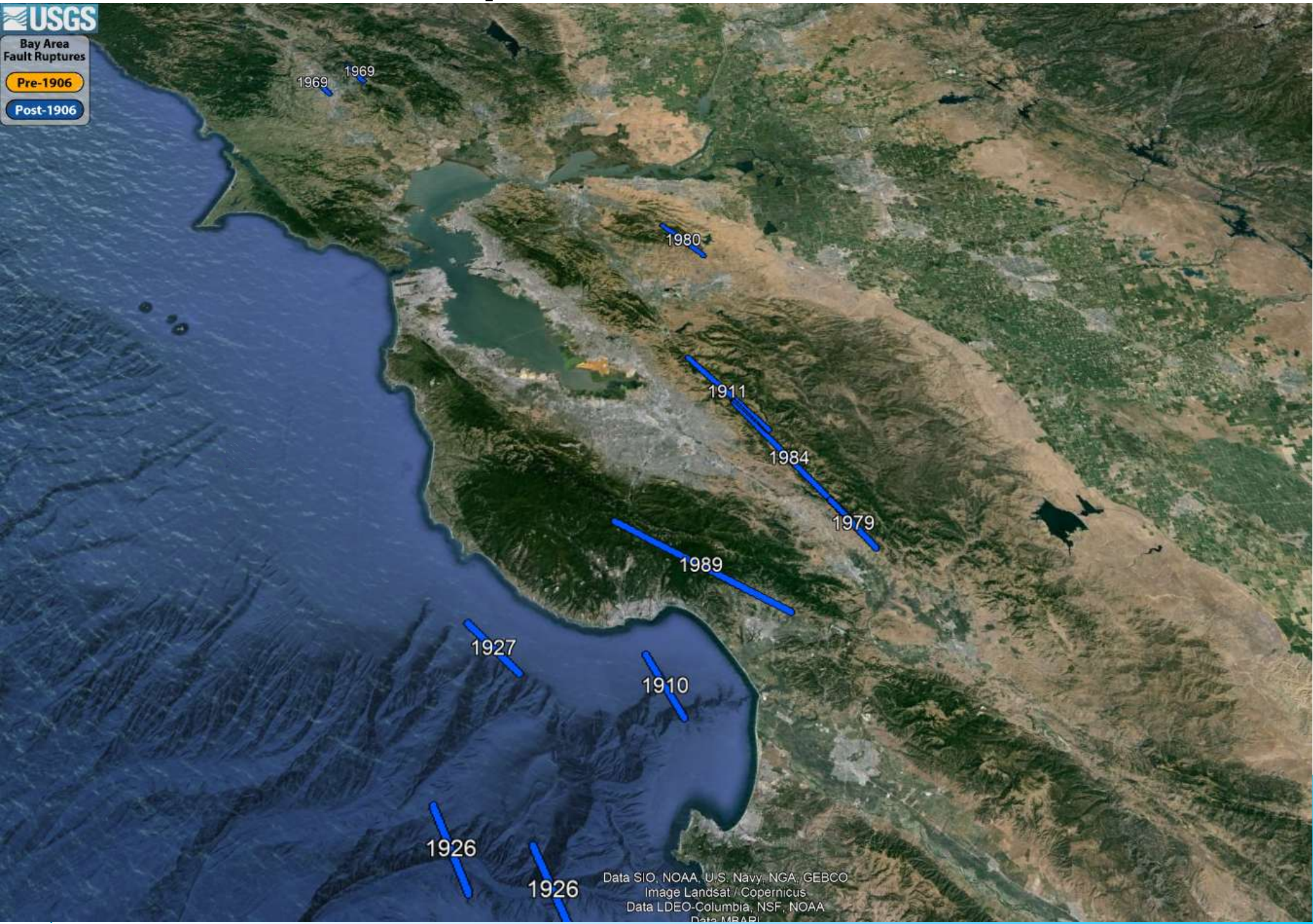
37°30'

### Faults

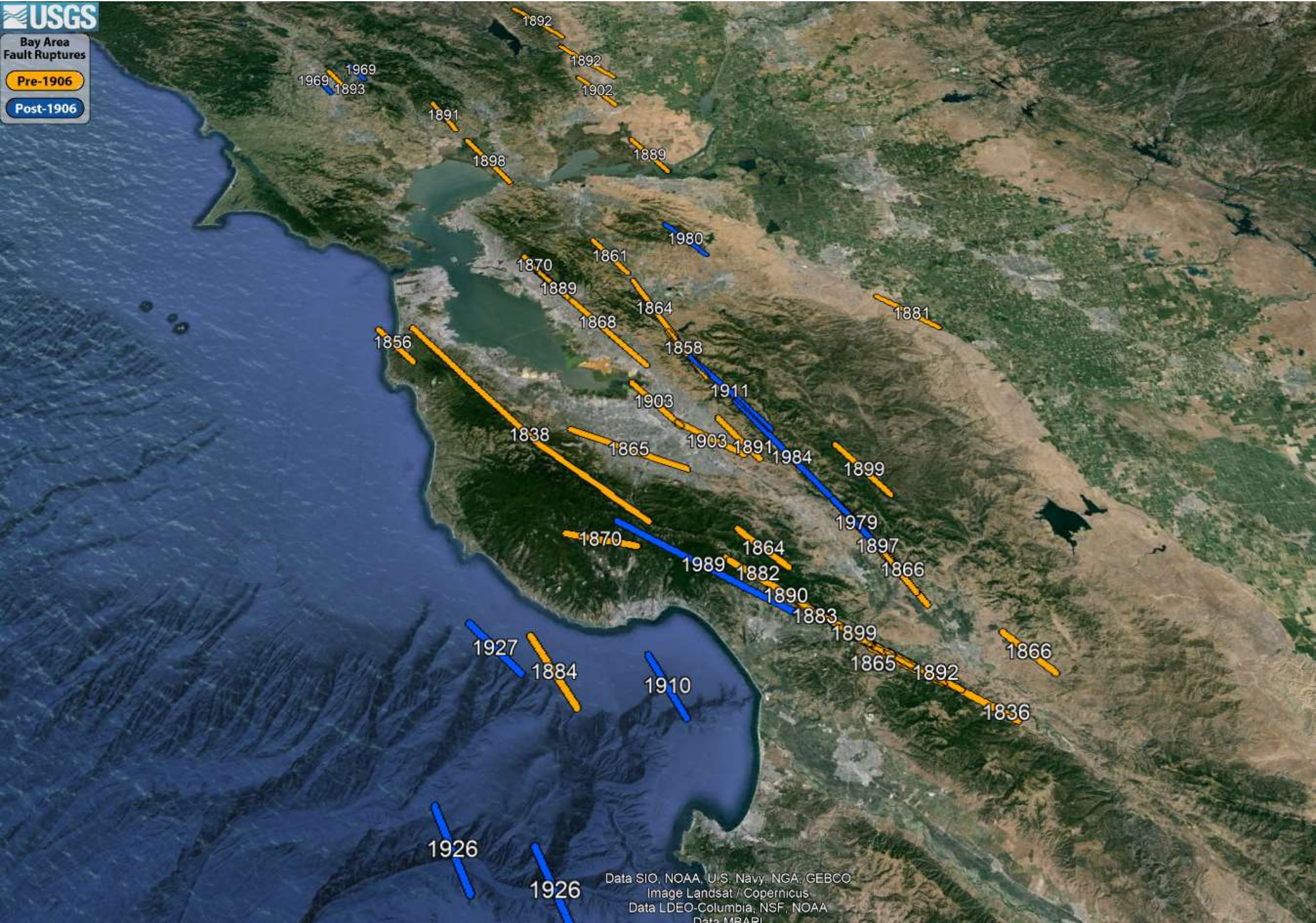
- 1 Wight Way
- 2 Collayami
- 3 Mysterious Ridge
- 4 Bennett Valley
- 5 West Napa
- 6 Trout Creek
- 7 Point Reyes
- 8 Gordon Valley
- 9 Midland
- 10 Franklin
- 11 Southampton
- 12 Los Medanos-Roe Island
- 13 Pittsburg-Kirby Hills
- 14 Clayton
- 15 Mt. Diablo North
- 16 Mt. Diablo South
- 17 Pilarcitos
- 18 Las Positas
- 19 Orestimba
- 20 Monte Vista-Shannon
- 21 Silver Creek
- 22 Ortigalita North
- 23 Ortigalita South
- 24 Sargent
- 25 Zayante-Vergeles
- 26 San Joaquin



# Post 1906 Earthquakes



# Adding in the pre-1906 Earthquakes



# Overall Risks



# 72%

Overall probability of a quake of magnitude 6.7 or greater striking somewhere in the Bay Area by the year 2043

The likelihood for individual faults in the Bay Area is shown on this USGS map of known active geological faults.



# Santa Clara County Hazard Mitigation Plan 2023

Table 1: Average Overall Hazard Risk Index Results

Hazard Risk Order	Hazard	Average Overall Hazard Risk Index Result
1	Earthquake	2.13
2	Wildfire, wildfire smoke, and air quality	1.71
3	Heavy precipitation, heavy winds, extreme temperatures	1.45
4	Drought	1.25
5	Climate change, including sea-level rise	1.19
6	Dam and levee failure	.83
7	Flood	.79
8	Landslide and mass movement	.41
9	Tsunami	.03





NAD 1983 2011 StatePlane  
California III FIPS 0403  
Source: Santa Clara County,  
ABAG, Esri  
6/21/2023 8:51 PM

## Santa Clara County Probabilistic Earthquake Shaking Hazard

The level of shaking shown has a 10% chance of being exceeded over the next 50 years. This is equivalent to a 500 year event.

City Boundary



- Violent shaking (MMI 9)
- Severe shaking (MMI 8)
- Very strong shaking (MMI 7)

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Source: Santa Clara County Local Hazard Mitigation Plan 2023

# San Andreas Fault

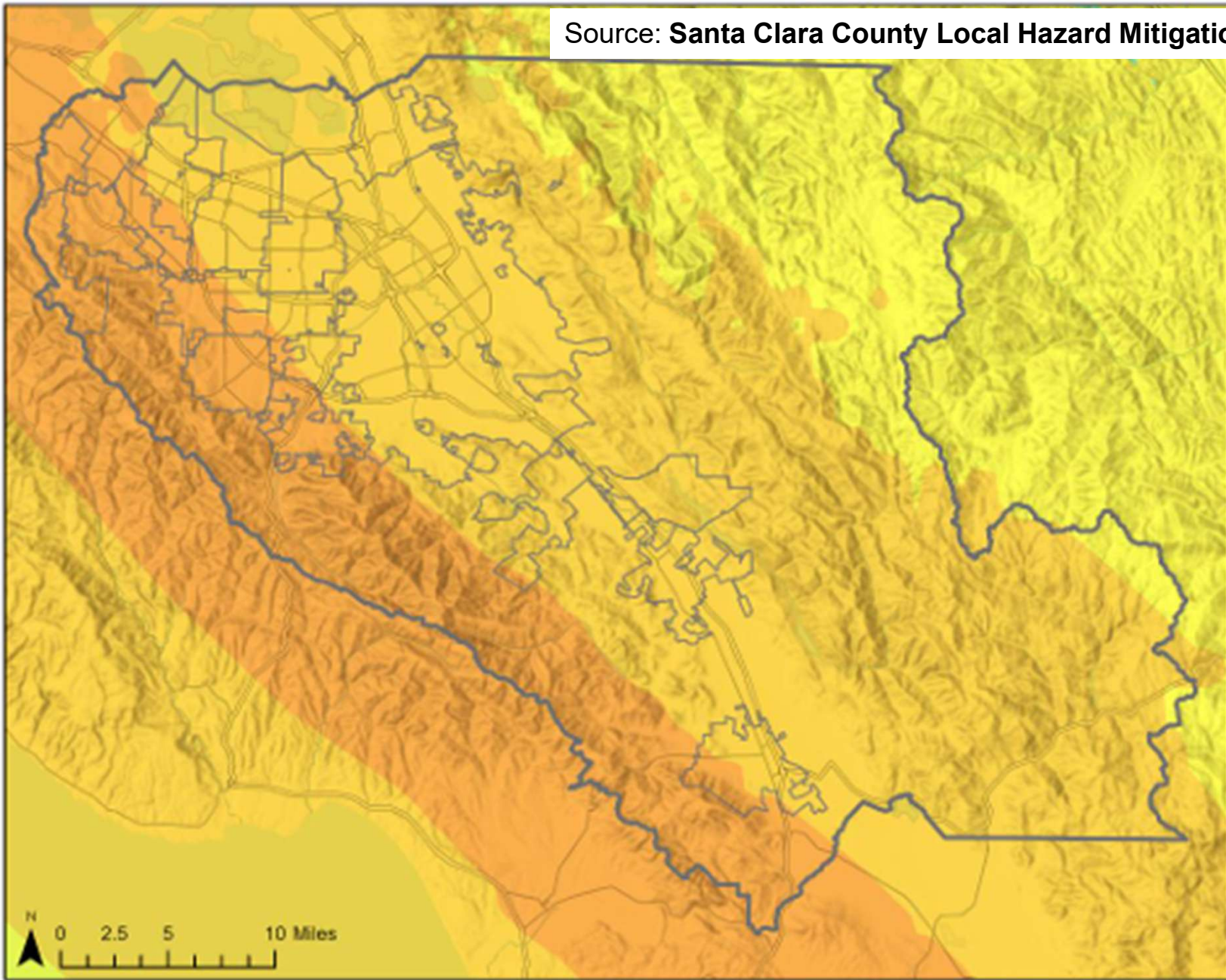


**22%**

Probability of magnitude 6.7 quake or greater on the San Andreas Fault by 2043.

The San Andreas Fault runs most of the length of California, from the Salton Sea in Southern California to Cape Mendocino. Because of its size, it's the only fault in the Bay Area capable of producing a 7.8 earthquake, according to geologists.





### Santa Clara County San Andreas 7.8 Scenario Earthquake PGA



NAD 1983 2011 StatePlane  
California III FIPS 0403

Source: USGS, Santa Clara  
County, Esri

5/13/2023 12:58 PM

PGA	
Not Felt (<math>< .17\%g</math>)	Moderate (3.9 - 9.2 %g)
Weak (.17 - 1.4 %g)	Strong (9.2 - 18 %g)
Light (1.4 - 3.9 %g)	Very Strong (18 - 34 %g)
	Severe (34 - 65 %g)
	Violent (65 - 124 %g)
	Extreme (>124 %g)
	City Boundary
	County Boundary



# Hayward-Rodgers Creek Fault

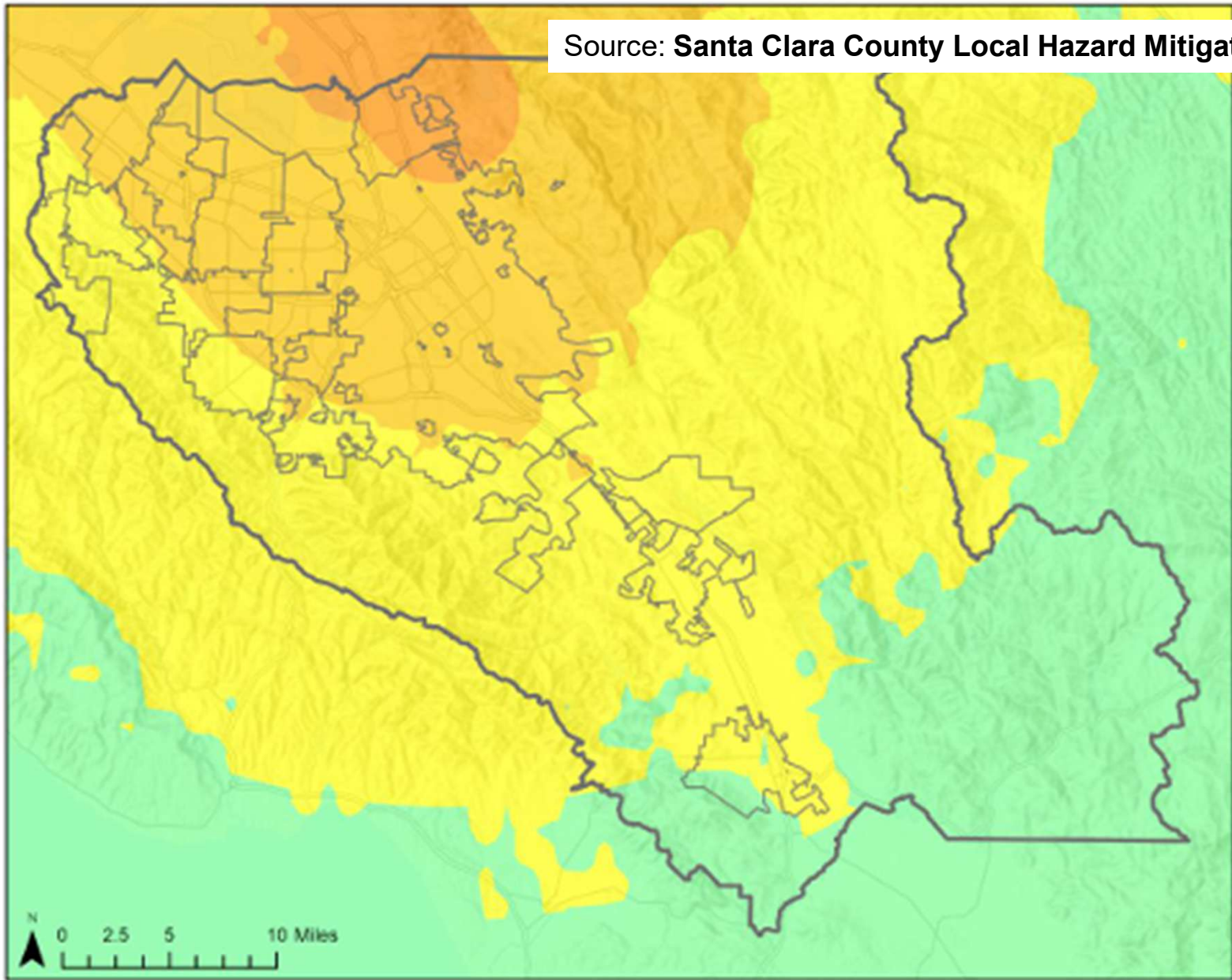


**33%**

Probability of a quake of magnitude 6.7 or greater on the Hayward-Rodgers Creek fault system by 2043.

The most likely source of the Bay Area's next devastating earthquake is this connected fault system. A quake on the heavily urbanized Hayward Fault, which stretches along the foot of the East Bay hills, would be more destructive than Loma Prieta.





NAD 1983 2011 StatePlane  
California III FIPS 0403  
Source: USGS, Santa Clara  
County, Esri  
5/13/2023 12:58 PM

### Santa Clara County Hayward 7.0 Scenario Earthquake PGA



#### PGA

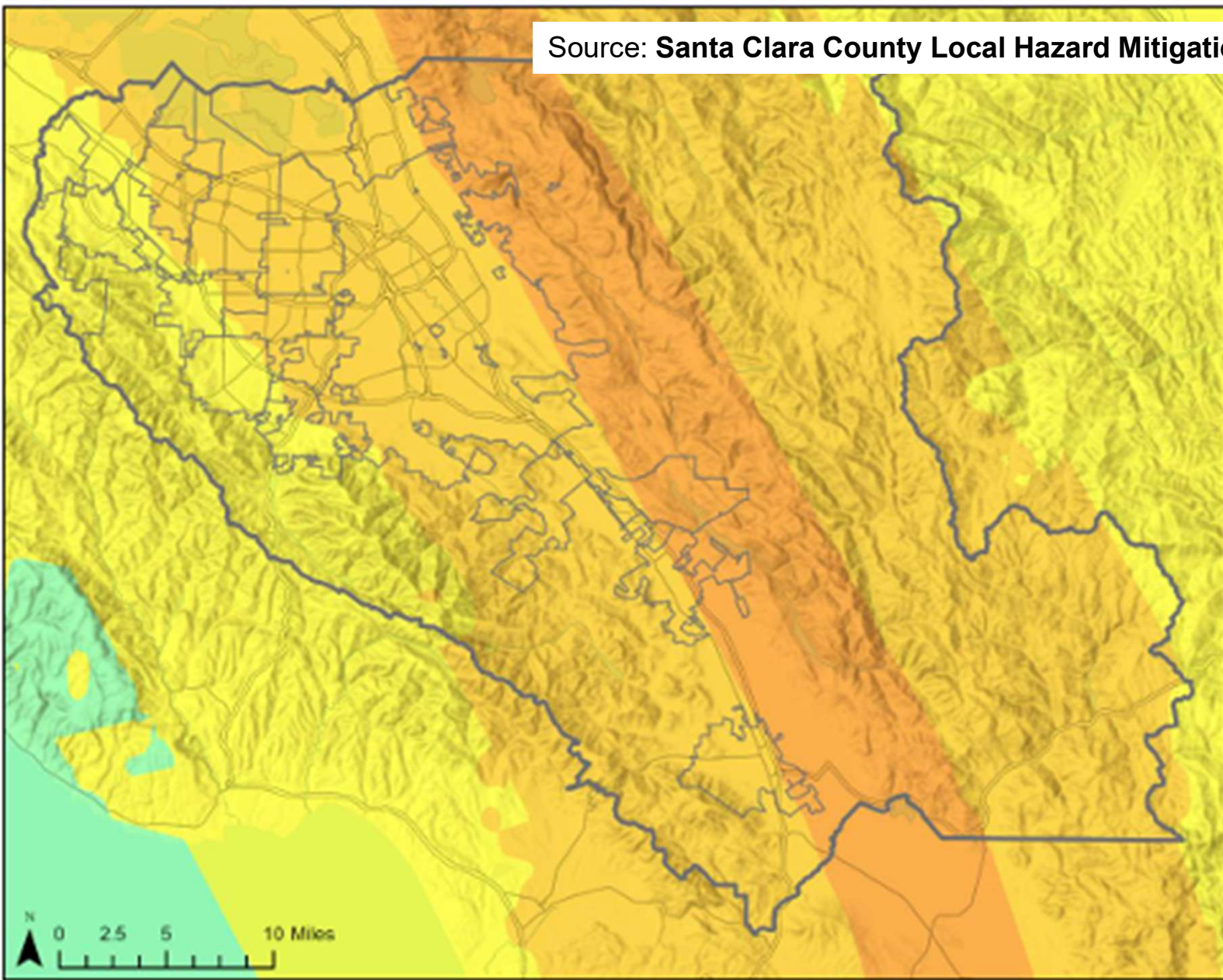
- Not Felt (<.17 %g)
- Weak (.17 - 1.4 %g)
- Light (1.4 - 3.9 %g)

- Moderate (3.9 - 9.2 %g)
- Strong (9.2 - 18 %g)
- Very Strong (18 - 34 %g)

- Severe (34 - 65 %g)
- Violent (65 - 124 %g)
- Extreme (>124 %g)

- City Boundary
- County Boundary





NAD 1983 2011 StatePlane  
California III FIPS 0403  
Source: USGS, Santa Clara  
County, Esri  
5/13/2023 12:58 PM

### Santa Clara County Calaveras M 7.0 Scenario Earthquake PGA



#### PGA

- Net Felt (<.17 %g)
- Weak (.17 - 1.4 %g)
- Light (1.4 - 3.9 %g)

- Moderate (3.9 - 9.2 %g)
- Strong (9.2 - 18 %g)
- Very Strong (18 - 34 %g)

- Severe (34 - 65 %g)
- Violent (65 - 124 %g)
- Extreme (>124 %g)

- City Boundary
- County Boundary

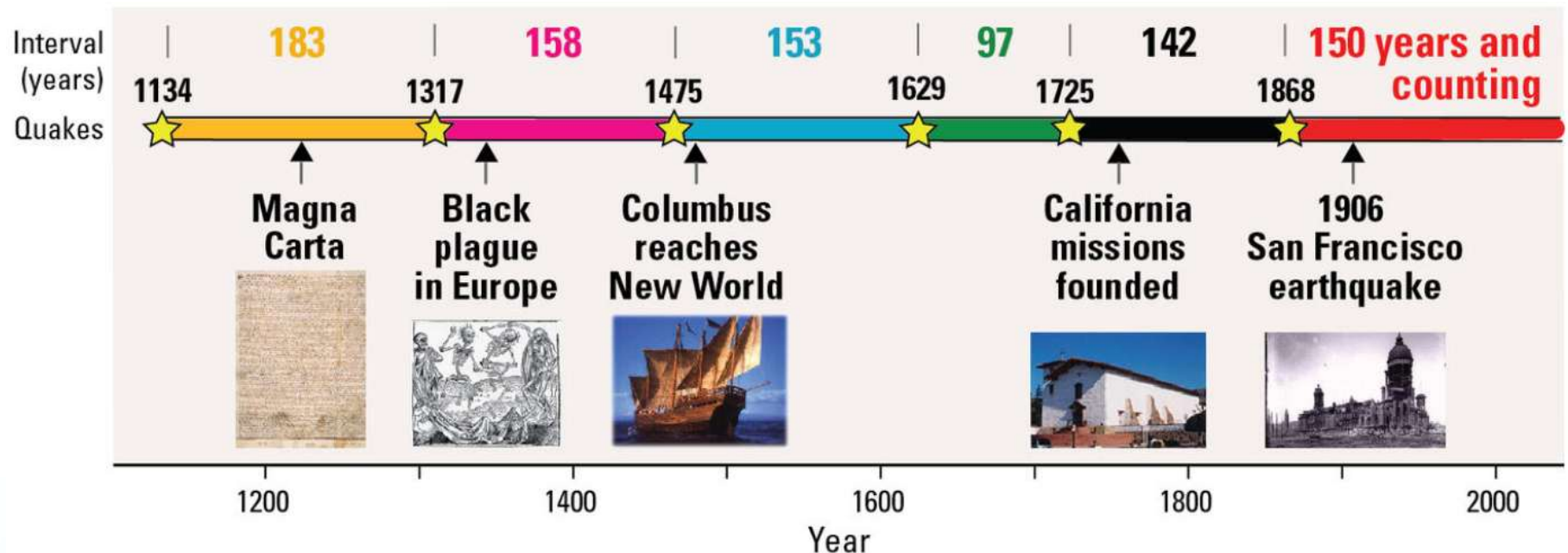


# Who's next?

<https://www.usgs.gov/news/featured-story/hayward-fault-it-due-a-repeat-powerful-1868-earthquake>

Per the USGS,

- The last six quakes on the Hayward fault occurred at intervals of 97 to 183 years, with an average interval of about 150 years.
- The 150th anniversary of the 1868 quake was in 2018; scientists are convinced that the Hayward Fault has reached the point where a powerful, damaging earthquake can be expected at any time.



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# The situation in Cupertino



# Cupertino Geology

We are not without 'faults'

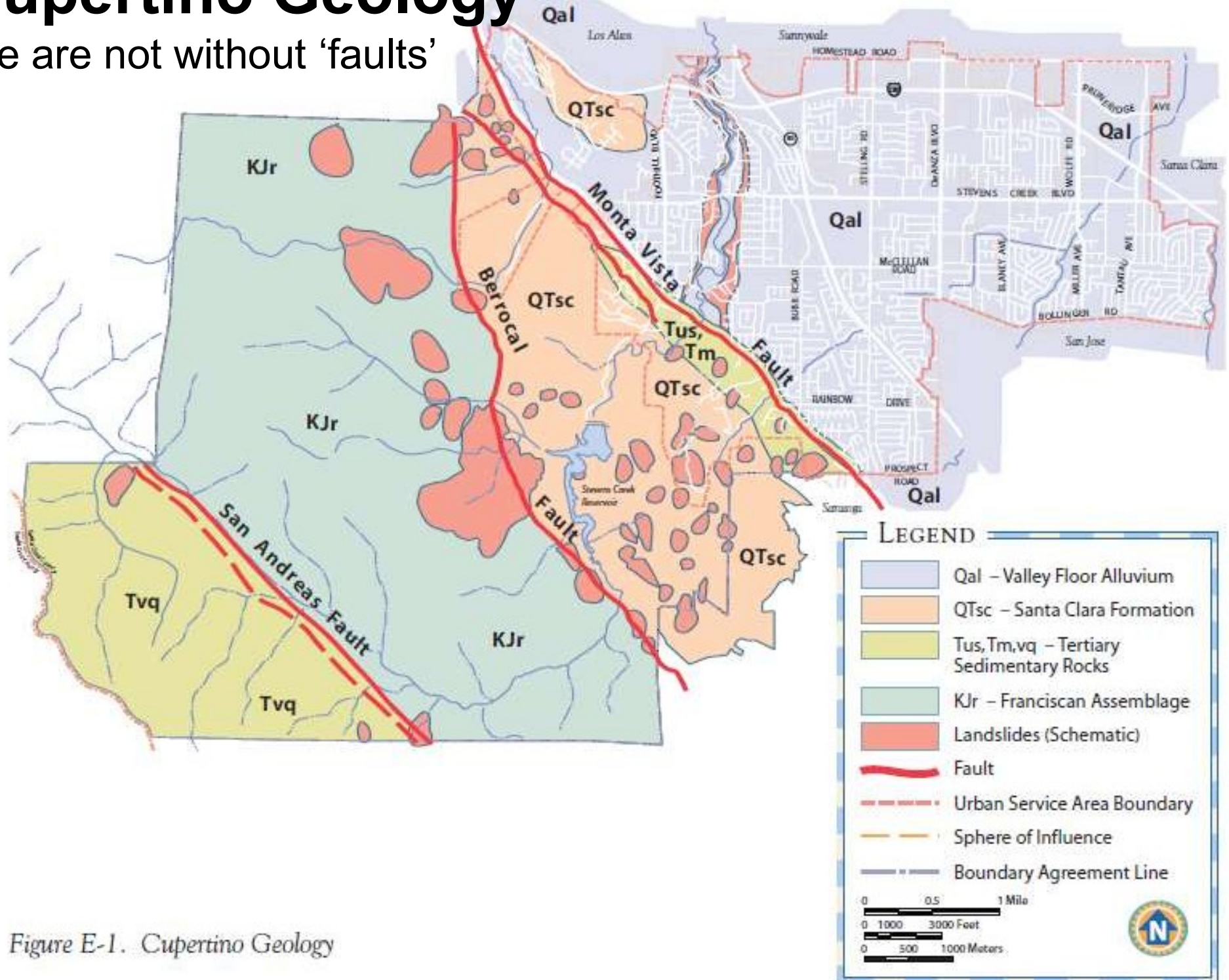


Figure E-1. Cupertino Geology

# Local and small earthquakes

4 km WSW of Cupertino CA

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Sep 21 2023 00:14	2.9	Monta Vista Fault
Sep 22 2023 11:03	2.8	Monta Vista Fault
Sep 22 2023 23:59	2.1	Monta Vista Fault
Oct 22 2023 22:49	1.9	Monta Vista Fault
Nov 4 2023 19:10	1.4	Monta Vista Fault
Nov 4 2023 19:24	1.0	Berrocal Fault
Nov 20 2023 18:59	1.2	Monta Vista Fault
Dec 2 2023 03:08	2.2	Monta Vista Fault
Jan 1 2024 04:39	1.4	Monta Vista Fault
Apr 20 2024 03:09	0.8	Valco?



# Regional and large earthquakes

[https://ia.cpuc.ca.gov/Environment/info/esa/monta/monta\\_geo.htm](https://ia.cpuc.ca.gov/Environment/info/esa/monta/monta_geo.htm)

- The San Andreas is an active fault.
- The Monta Vista and Berrocal faults are considered potentially active.

Fault	Last Activity Year	Dist, Direction from Cupertino	Max Probable Magnitude
San Andreas (Loma Prieta segment)	1989	4.5mi, Southeast	7.25
San Andreas (San Francisco segment)	1906	30mi, Northwest	8.00
Hayward (southern segment)	1836, 1868	16mi, East	7.50
Calaveras (southern segment)	1861	18mi, East	7.25
Sargent	< 10,000	16mi, South	6.75
San Gregorio/Hosgri	< 11,000	20mi, West	7.75
Monta Vista	< 700,000	2mi, West	6.50
Berrocal	< 1.6 million	2mi, Southwest	6.00

- We likely will experience severe shaking from the Hayward or San Andreas faults.

Source: **California Public Utilities Commission**



# Summary of Earthquake Risks

the bottom line...

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By 2043...

1. >99% chance of a M6.7 or greater earthquake somewhere in California
2. 98% chance of one or more magnitude-6.0 or greater quakes hitting the Bay Area.
3. 76% chance of a M7.0 or greater earthquakes will strike No. California
4. 75% chance of a M7.0 or greater earthquakes will strike So. California
5. 72% overall probability of a M6.7 or greater earthquake striking somewhere in the Bay Area.
6. 51% chance of a magnitude-7.0 or greater quakes hitting the Bay Area.
7. The Hayward Fault is likely to be the next to go, with a 33% probability of a magnitude 6.7 or greater



# Hayward-Rodgers Creek Fault

<https://earthquake.usgs.gov/education/shakingsimulations/hayward/>

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## Hayward Fault Scenarios

- The most recent large earthquake on the [Hayward fault](#) was in 1868, 158 years ago.
- The Hayward and Rodgers Creek faults are the most likely faults to produce a large earthquake in the Bay Area.
- Computer simulations of large, anticipated earthquakes on the Hayward and Rodgers Creek faults:
  - Note how long it takes before the heaving shaking reaches San Jose
  - [M6.8 Earthquake Scenarios](#)
  - [M7.0 Earthquake Scenarios](#)
  - [M7.2 Earthquake Scenarios](#)



# So, what does this mean?

<https://www.ready.gov/earthquakes>

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- **The next earthquake is a matter of “when”**
- **Get Alerts.** MyShake App: Free smartphone app for iPhone and Android users with audio and visual warnings [magnitude 4.5 or higher and Modified Mercalli Intensity III (weak) shaking].

The Hayward Earthquake simulations tell us the shaking story in Cupertino.

- **Have a plan.** Sheltering, communications, evacuation, etc.
- **Build a kit.** Food, water, first aid, batteries, radios, etc.
- **Prepare your home.** Family, structure, furnishings, transportation, etc.

Source: **Ready.gov**

<https://www.ready.gov/earthquakes>

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**Thank you**  
*Any Questions?*

