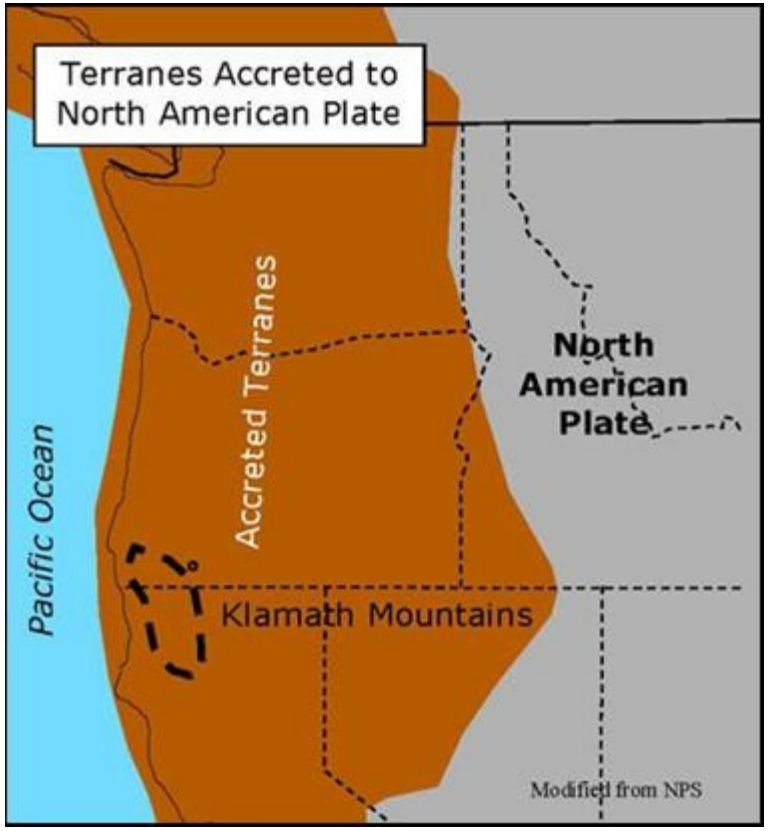
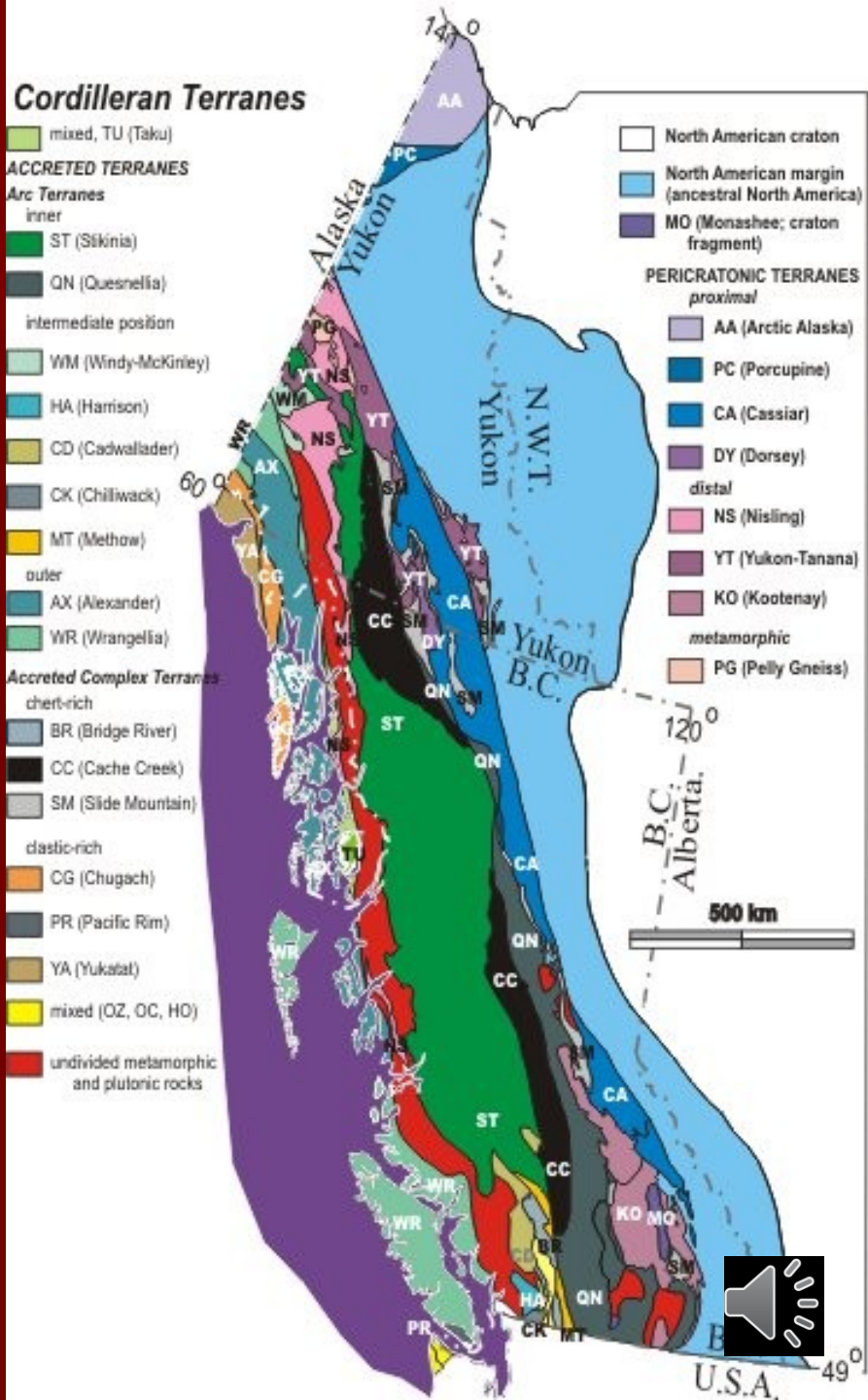

Alaska
1.2
1.5
3.7
3
5
1.5
NORTH
AMERICAN
CRATON
CORDILLERAN
MOBILE
BELT
PACIFIC
OCEAN
Canada
U.S.
1.
1.4
9
1.1
1.3
2.0
Belt
Basin
2.5
1.2
5.5
1.4
5
7
Uinta
Basin
1.2
2.1
Apache
Basin
0.6


Terranes Accreted to
North American Plate
Pacific Ocean
Accreted Terranes
North
American
Plate
Klamath Mountains
Modified from NPS

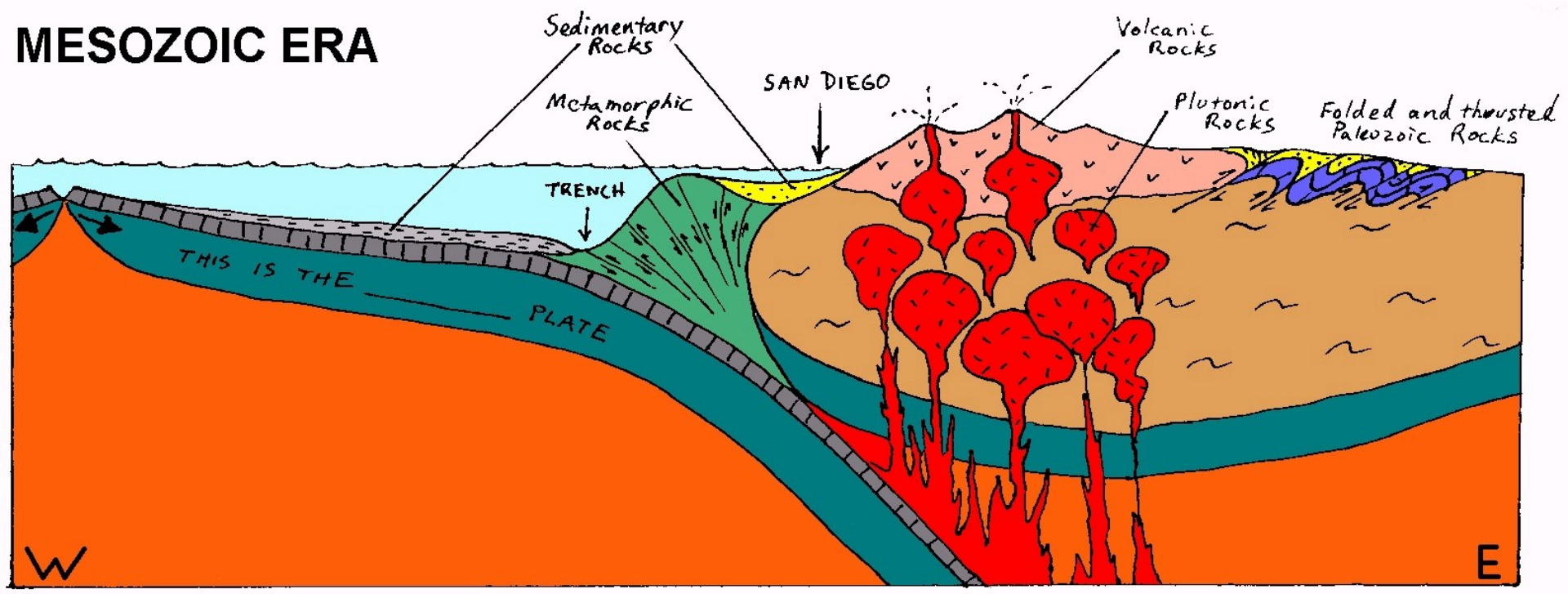
What is a Tectonostratigraphic Terrane?

Terranes can be:

- *Native* – showing shared traits with North American crust, indicating an origin adjacent to North America.
- *Exotic* – Far-traveled, not born adjacent to North America
- *Superterranes* – *amalgamated* with other terranes before *accretion* to the continental margin.

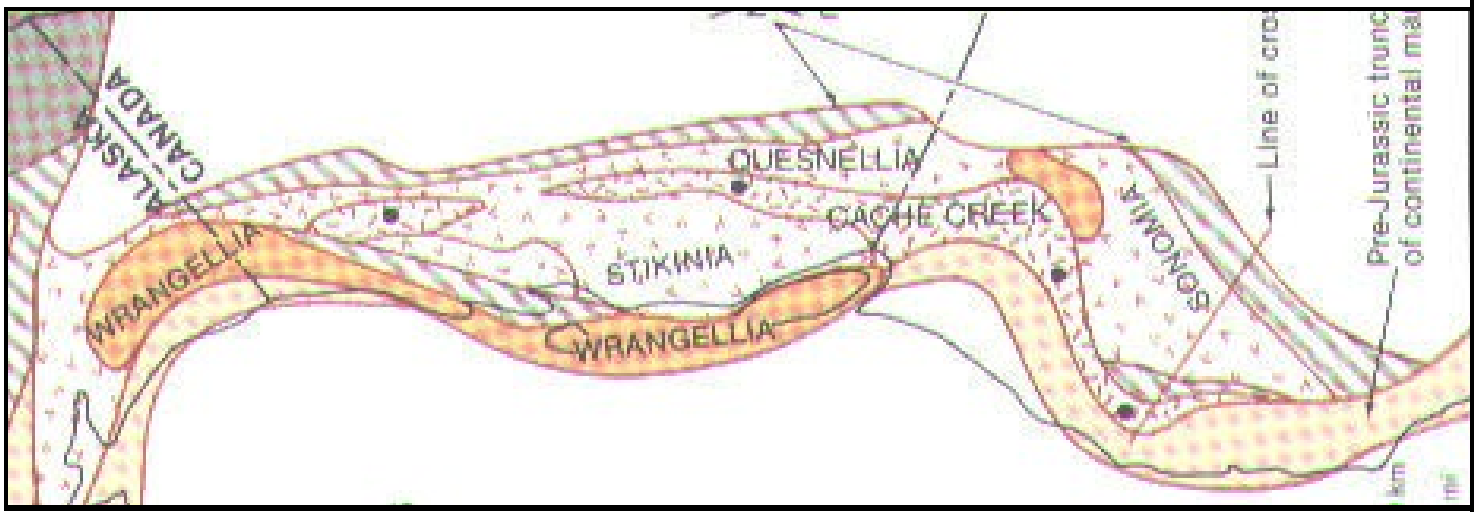


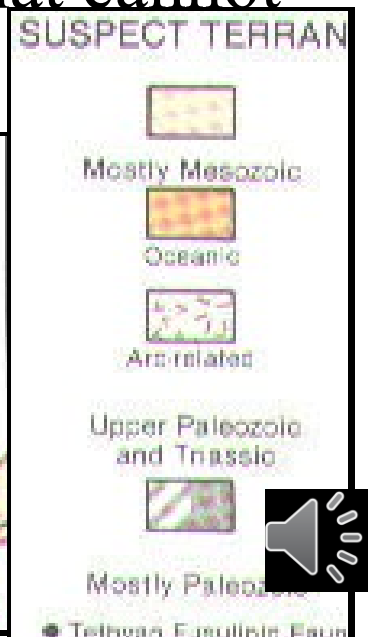
MESOZOIC ERA



The Western Collage

- Cordillera an collage of microplates and arcs
  - accreted during the Paleozoic and Mesozoic
  - terrains have different rock types and fossil assemblages that cannot be correlated
  - suspect terrains--fault-bounded regions that cannot be correlated





Accreted or “suspect” terranes

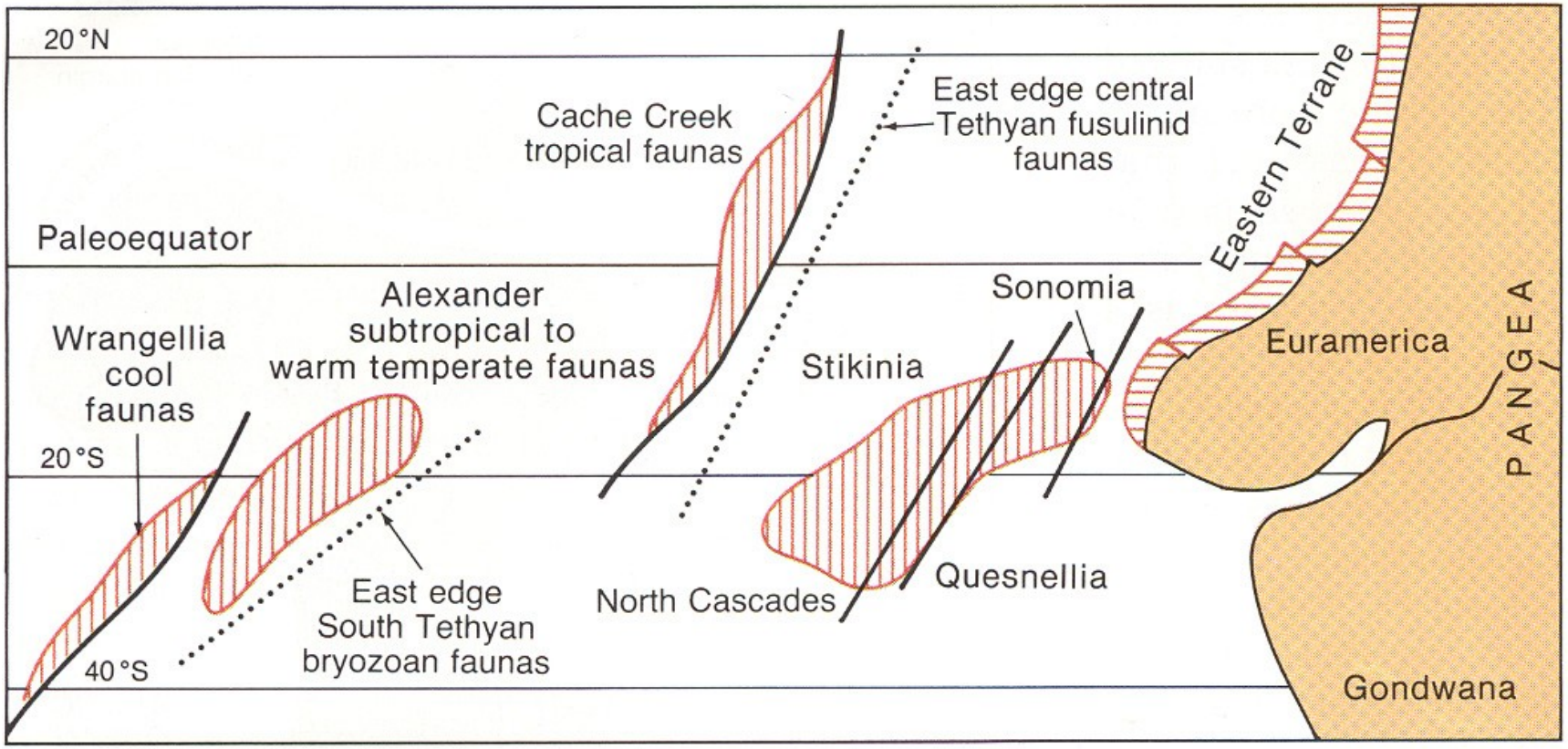


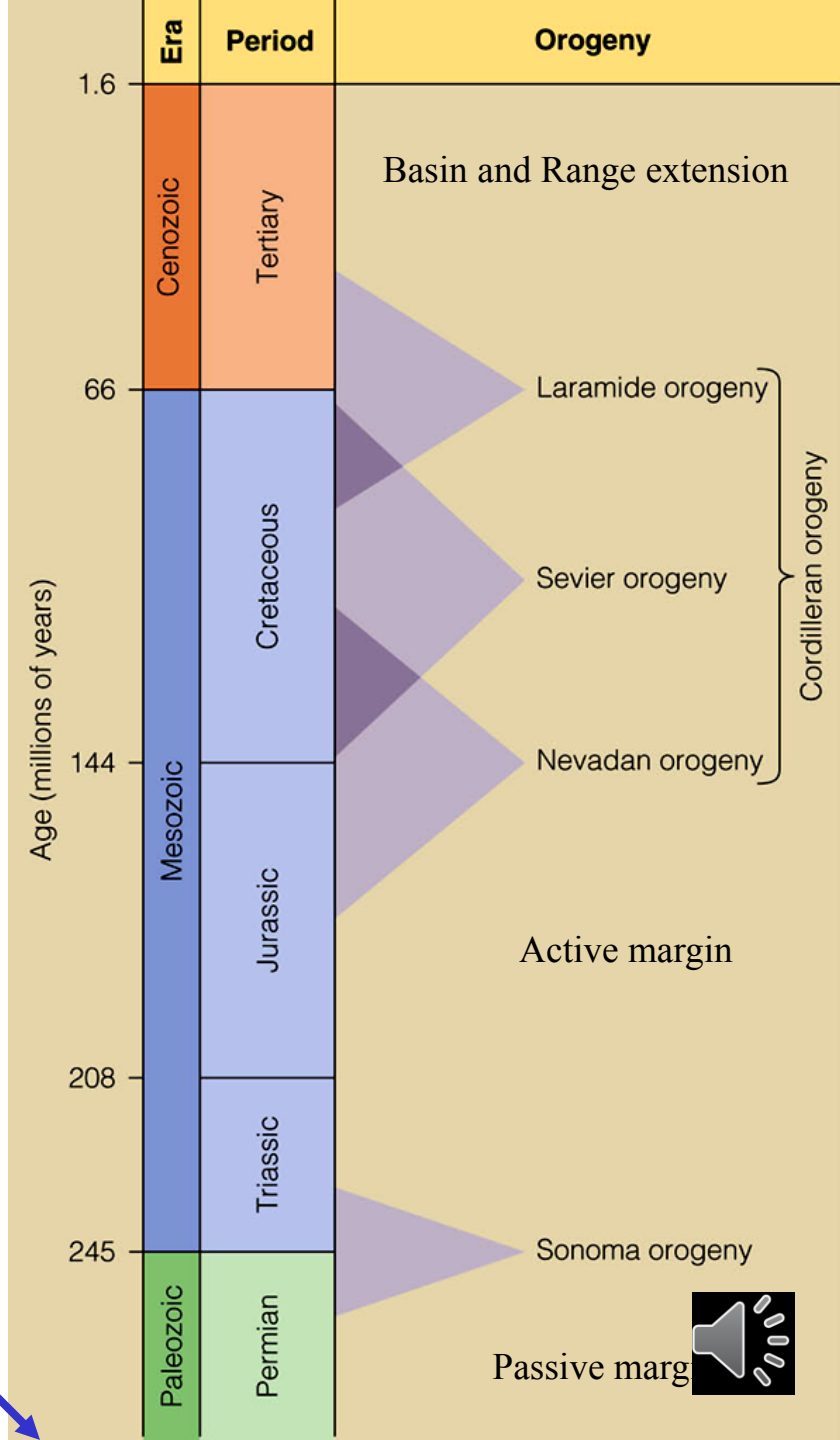
FIGURE 14.18

Dott & Prothero

KORDILERY

K
O
R
D
I
L
E

Antler Orogeny in Devonian-Carb.



Paleozoic Passive Margin

- Existed in Late Precambrian and Paleozoic
- Craton and cratonic basin deposits
- Miogeocline continental shelf deposits

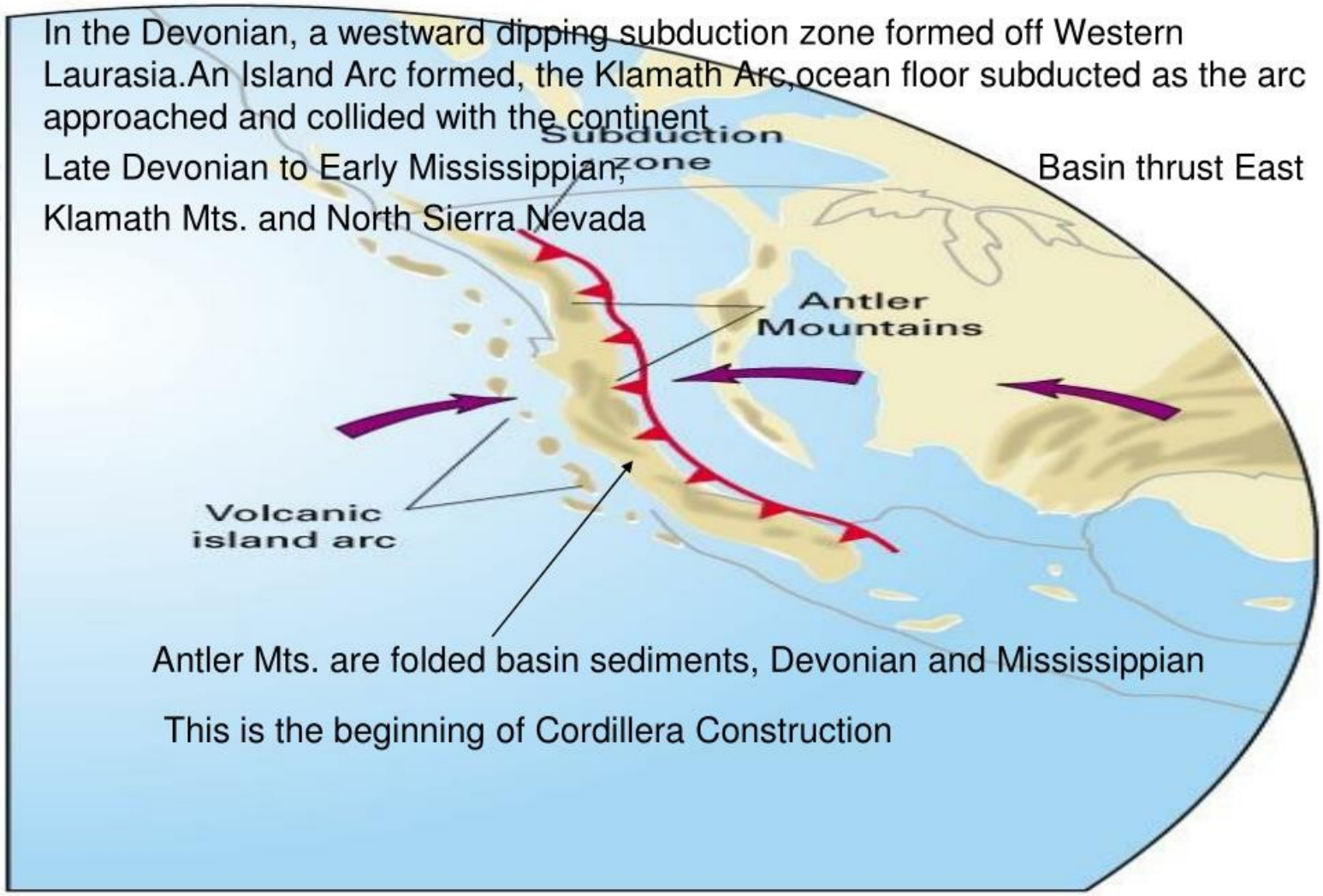
Antler Orogeny

(300 (300-375 Ma) 375 Ma)

- Late Devonian - Mississippian
- Collision of the arc with a passive margin
- Roberts Mountain Allochton thrust over the passive margin
- A series of foreland basins formed in eastern Nevada

Antler Orogeny

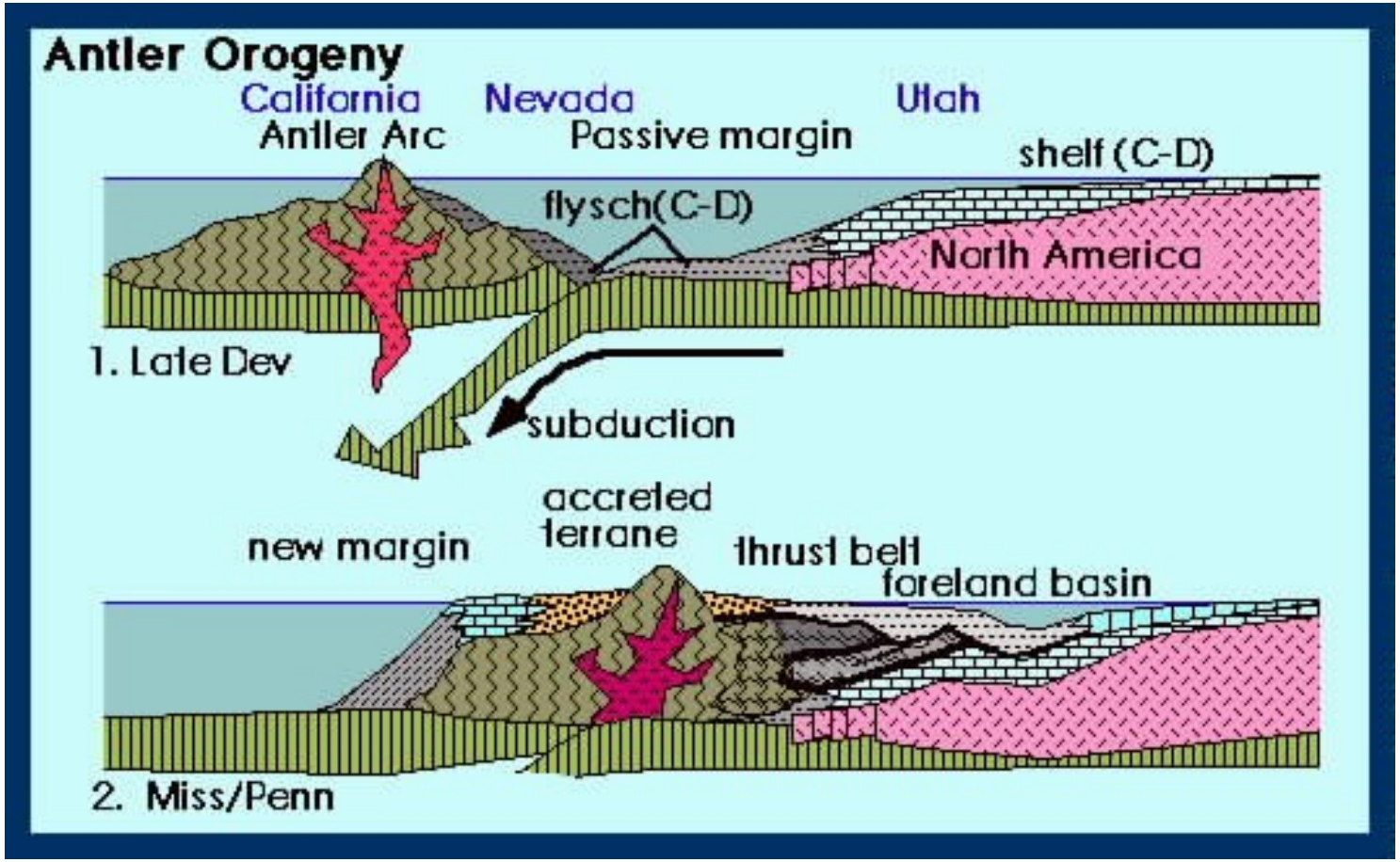
- In the Devonian, a westward dipping subduction zone formed off Western Laurasia.An Island Arc formed, the Klamath Arc,ocean floor subducted as the arc approached and collided with the continent.
- Late Devonian to Early Mississippian;
- Klamath Mts. and North Sierra Nevada



Antler Mts. are folded basin sediments, Devonian and Mississippian

This is the beginning of Cordillera Construction

Orogeneze: antlerská, kolize klamathského ostrovního oblouku v devonu a spodním karbonu



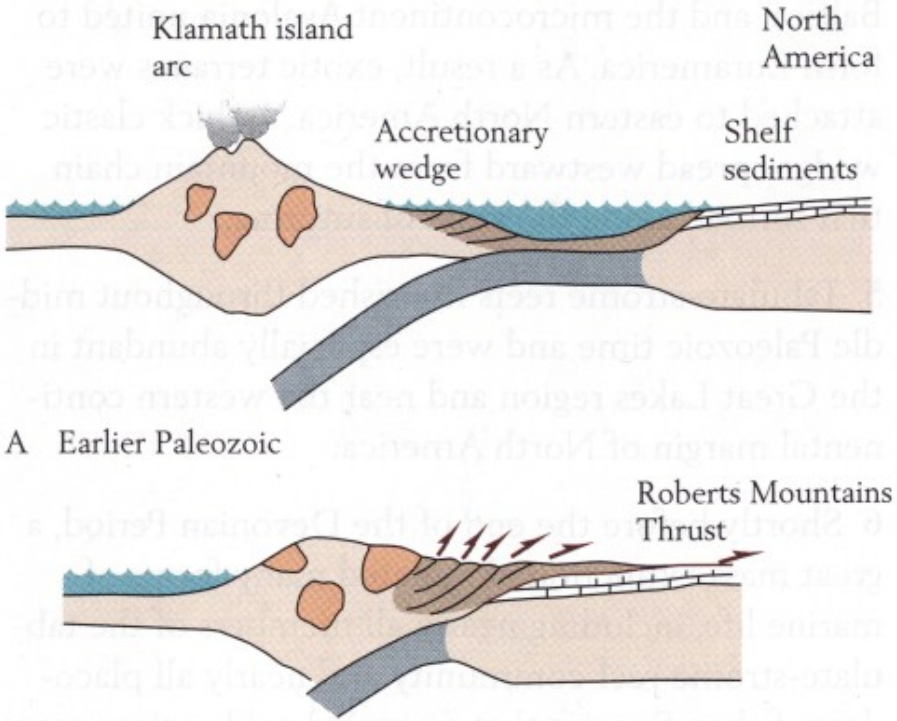
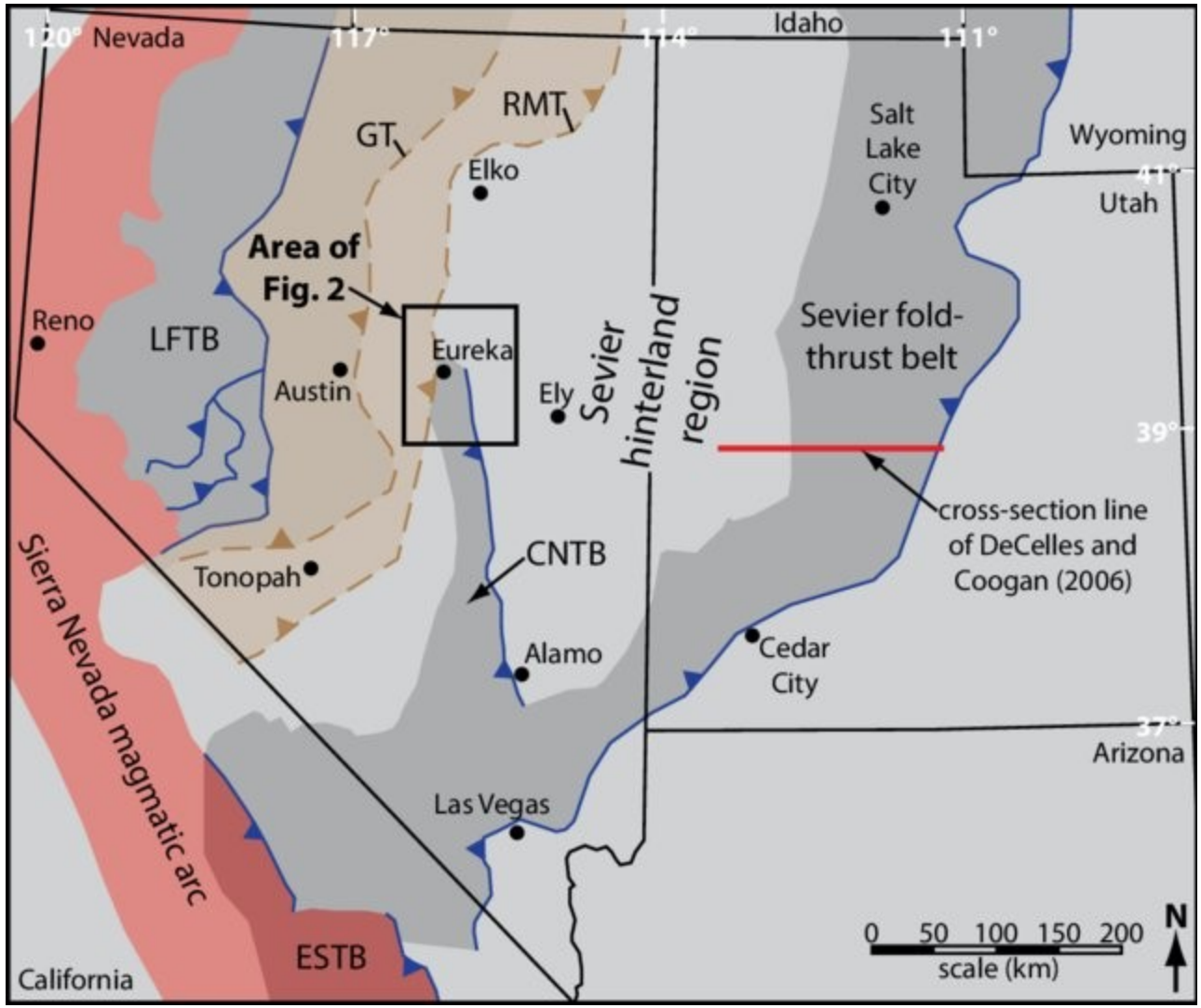
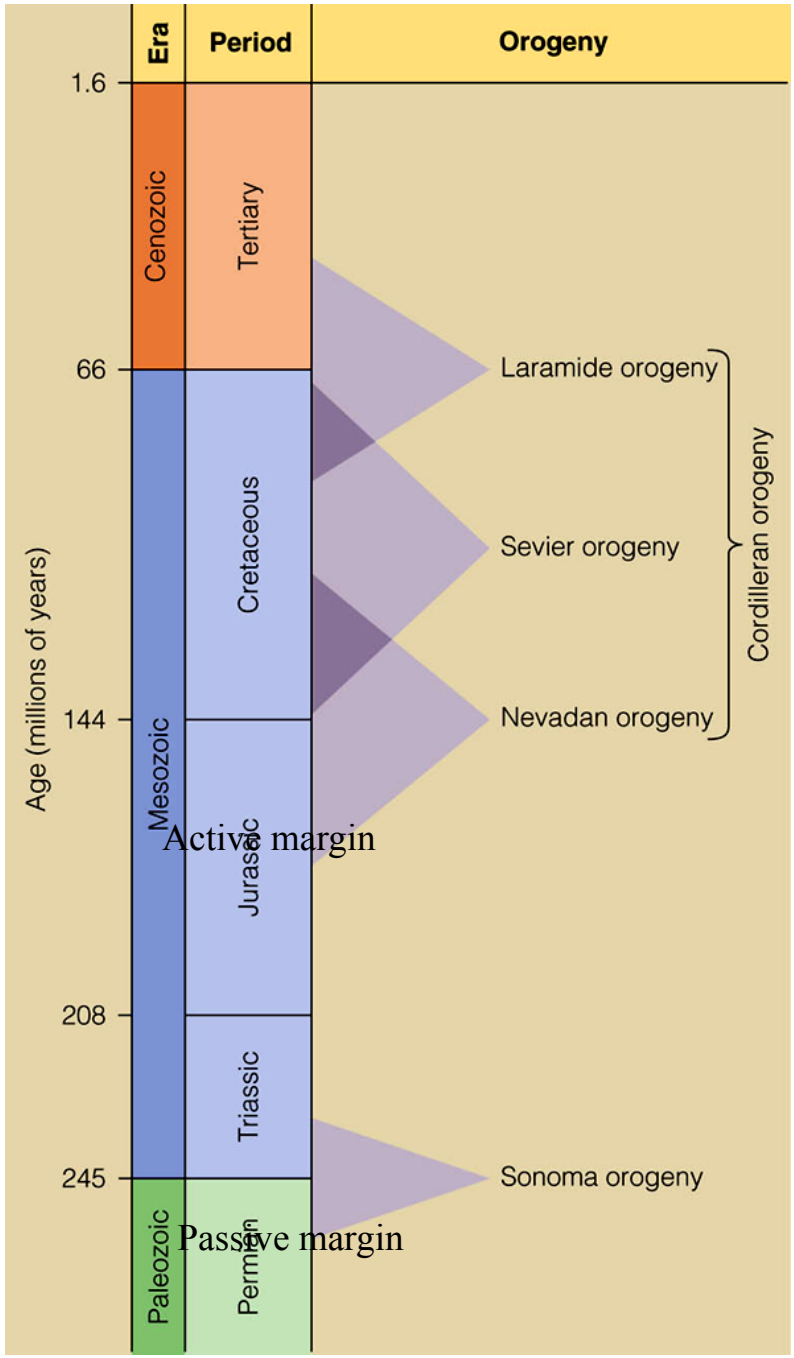


Figure 14-31 **The likely mechanism by which the Klamath Arc was added to the North American continent by the Antler orogeny during Late Devonian and Mississippian time.** The basin between the craton and the Klamath Arc *(A)* closed. As the continental crust was thrust beneath the volcanic crust of the Klamath Arc, deep-sea sediments slid onto shallow-water carbonates along the Roberts Mountains Thrust *(B)*.


120°
Nevada
117°
114°
Idaho
111°
RMT
GT
Elko
Salt
Lake
City
Wyoming
41°
Utah
Area of
Fig. 2
Reno
LFTB
Eureka
Austin
Ely
Sevier
hinterland
region
Sevier fold-
thrust belt
39°
cross-section line
of DeCelles and
Coogan (2006)
CNTB
Tonopah
Sierra Nevada magmatic arc
Alamo
Cedar
City
37°
Arizona
Las Vegas
ESTB
California
0 50 100 150 200
scale (km)
N

Mesozoic

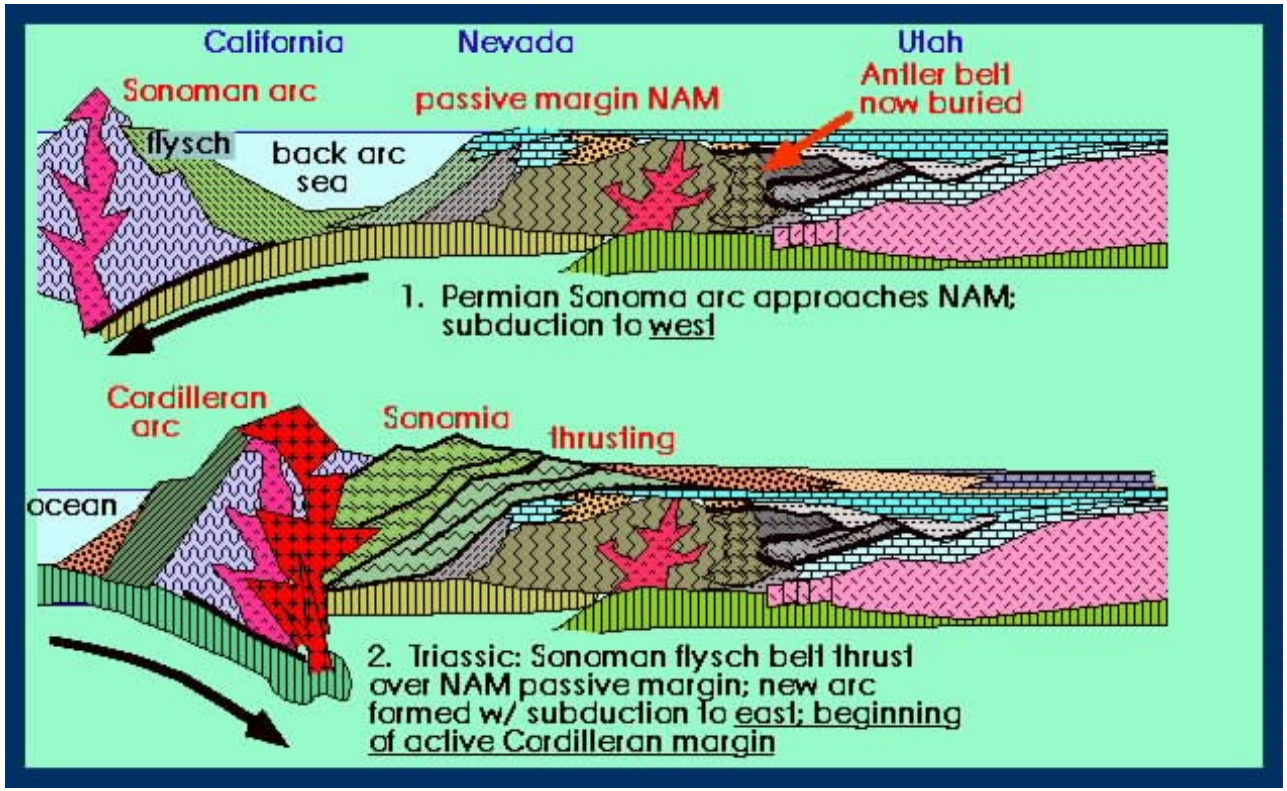

Era
Period
Orogeny
1.6
66
144
208
245
Age (millions of years)
Cenozoic
Mesozoic
Paleozoic
Tertiary
Cretaceous
Jurassic
Triassic
Permian
Laramide orogeny
Sevier orogeny
Nevadan orogeny
Cordilleran orogeny
Sonoma orogeny
Active margin
Passive margin

Sonoma Orogeny (200-280 Ma)

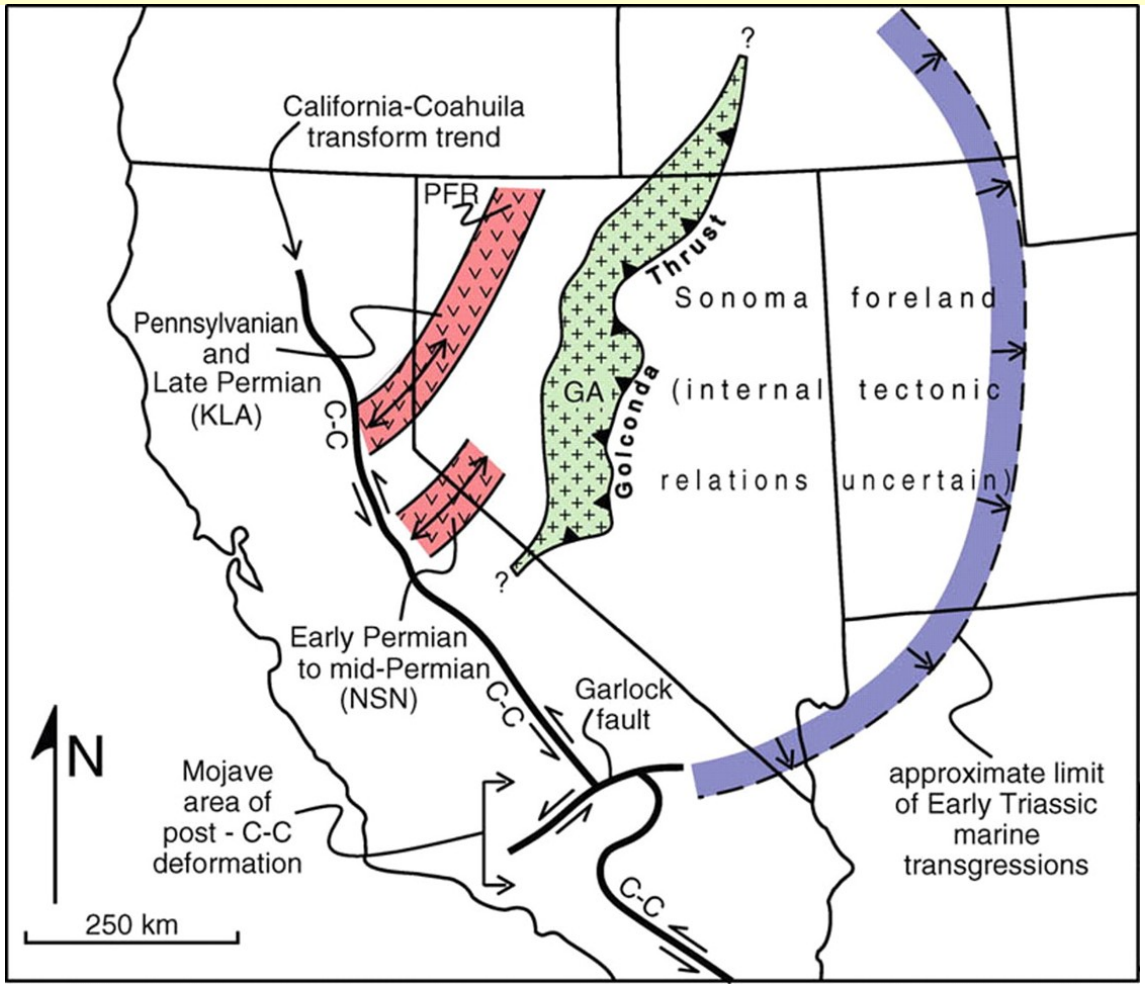
- Permo -Triassic
- Collision of Arc With a Passive Margin
- Island Arc Terrains Were Accreted
- golconda allochthon

Thrust Partly Over Roberts Mountain Allochthon

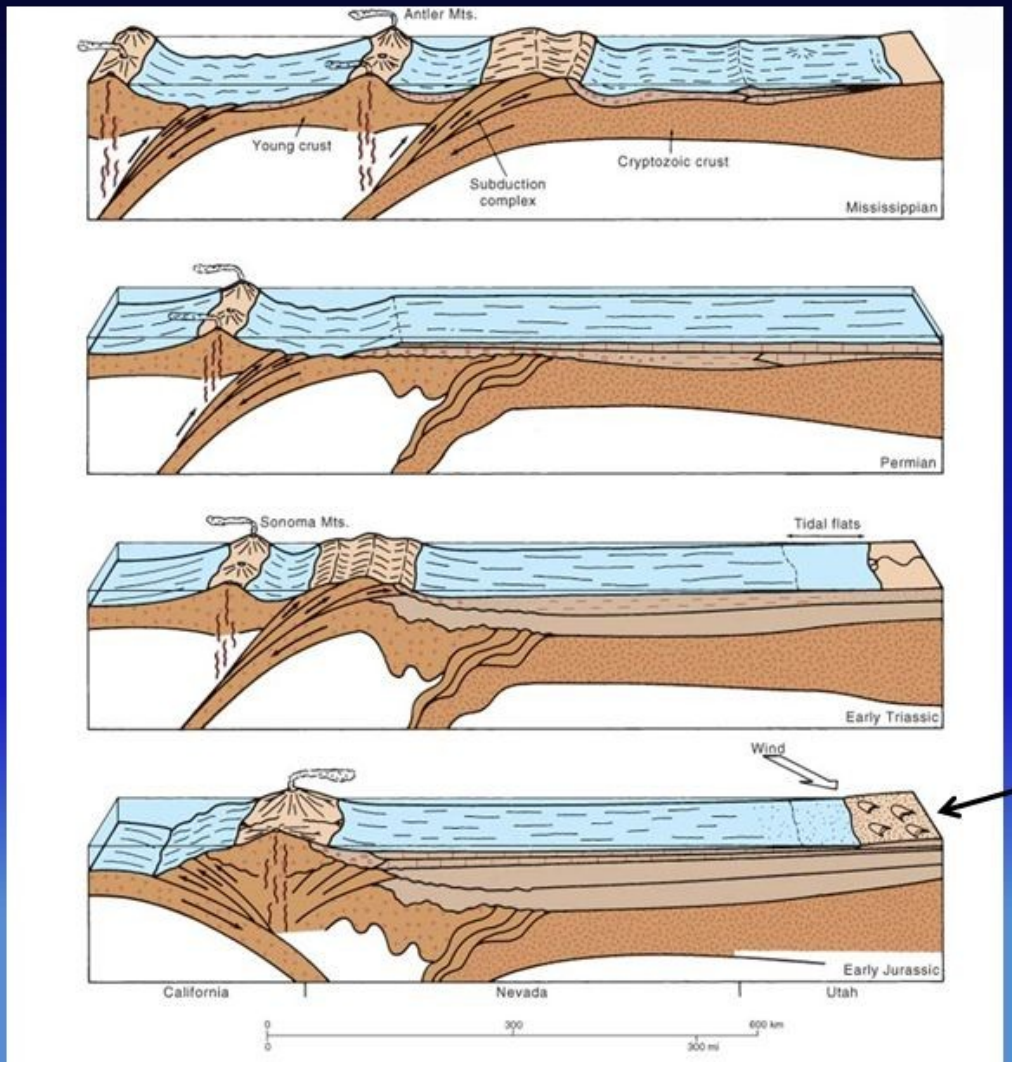
sonomská, kolize dalšího ostrovníhp oblouku na konci paleozoika



A hick oceanic sequence of Mississippian through Permian chert, limestone, conglomerate, siltstone, shale, lava flows and pyroclastics **accumulated in a trough west of the Antler orogenic belt**. This tectonic assemblage was **emplaced along the Golconda thrust, at least 60 miles (100 km) eastward** or inboard of the new continental margin, during the Late Permian through Early Triassic Sonoma Orogeny (Speed, 1983).



Late Triassic Transition to Andean-type Margin



Antler Orogeny

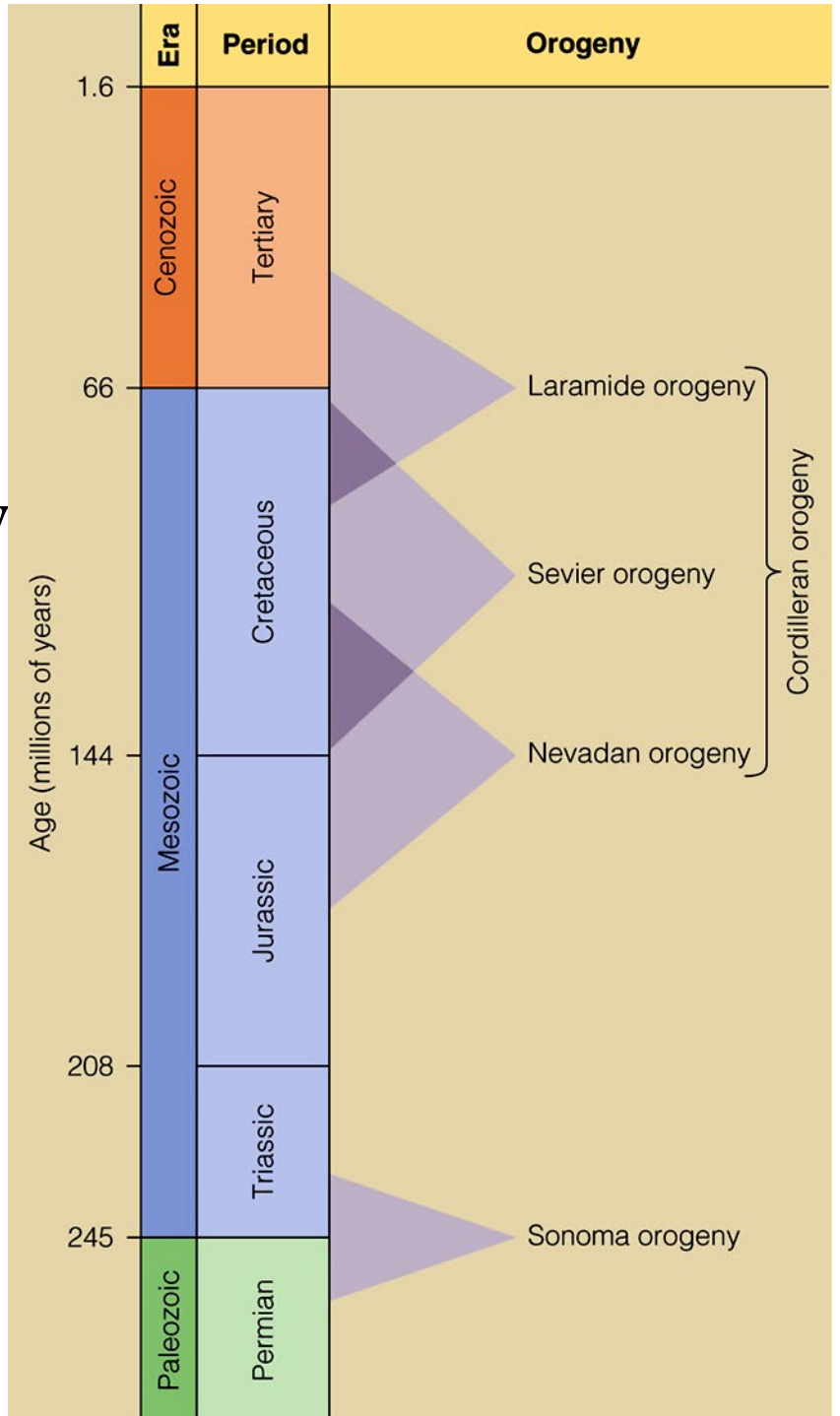
Accretion of Suspect/Exotic Terranes and Volcanic Arcs

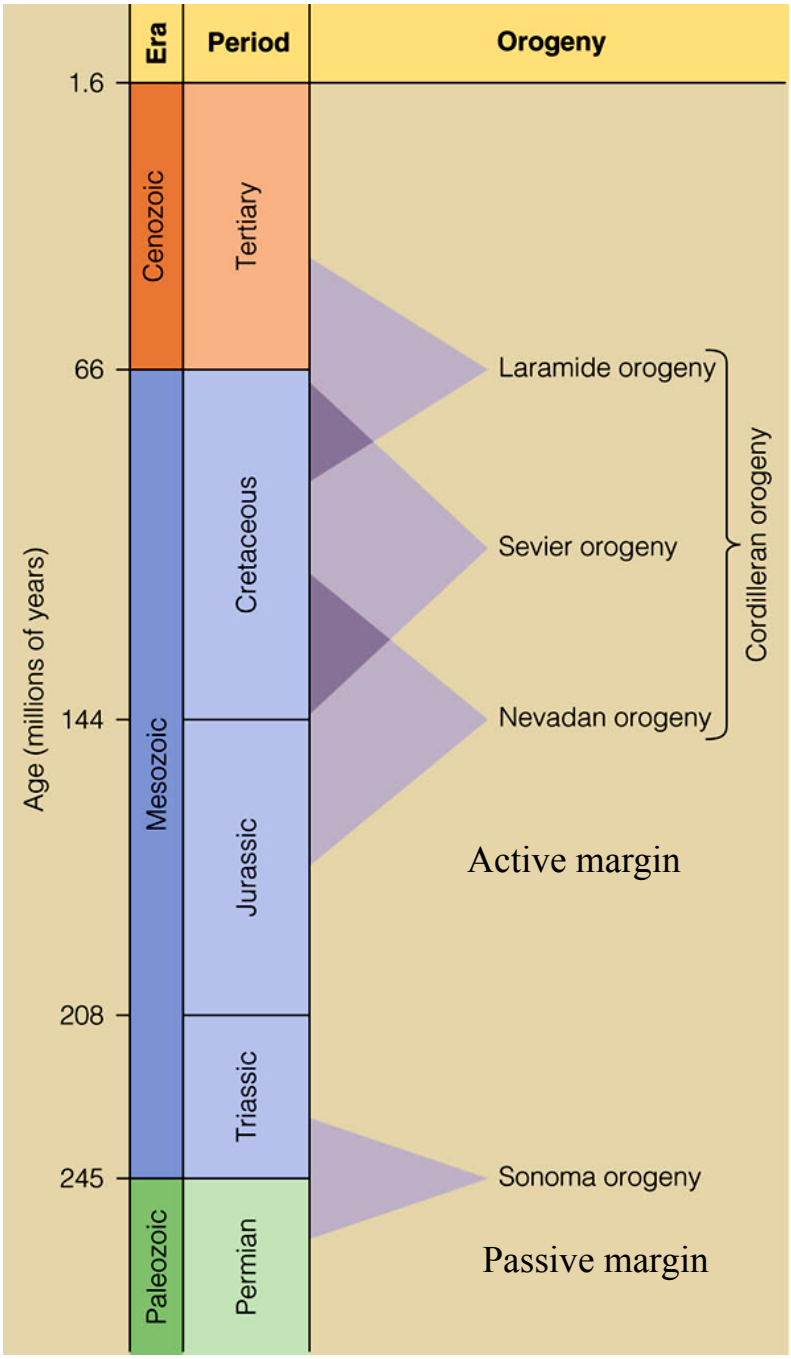
Sonoman Orogeny

Navajo Sandstone

Sierran Orogeny

Cordilleran orogeny



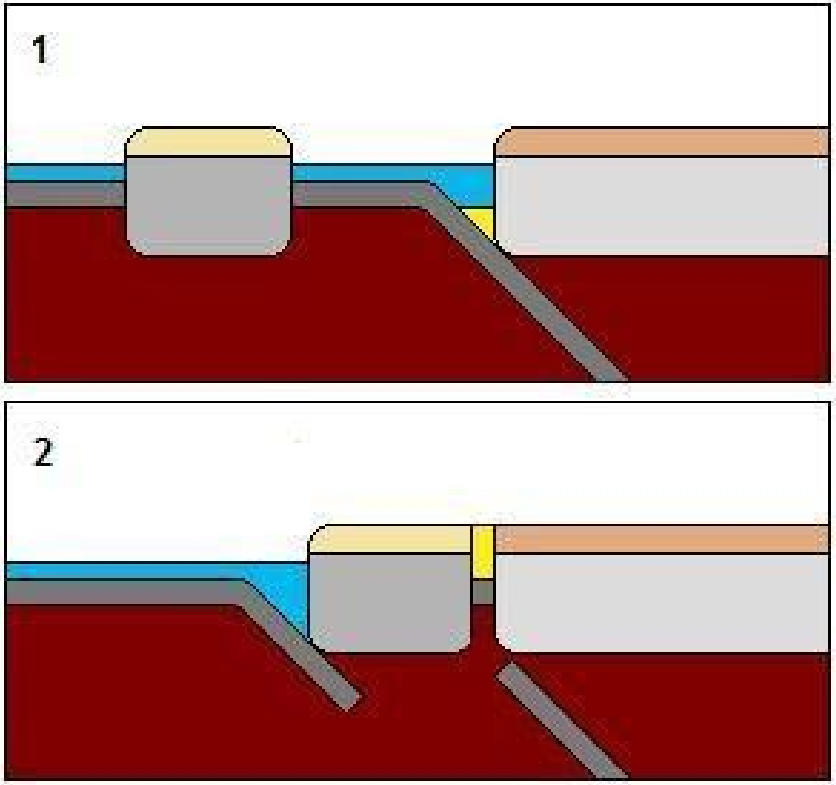


Cordilleran Orogeny components – Jurassic – Tertiary Periods

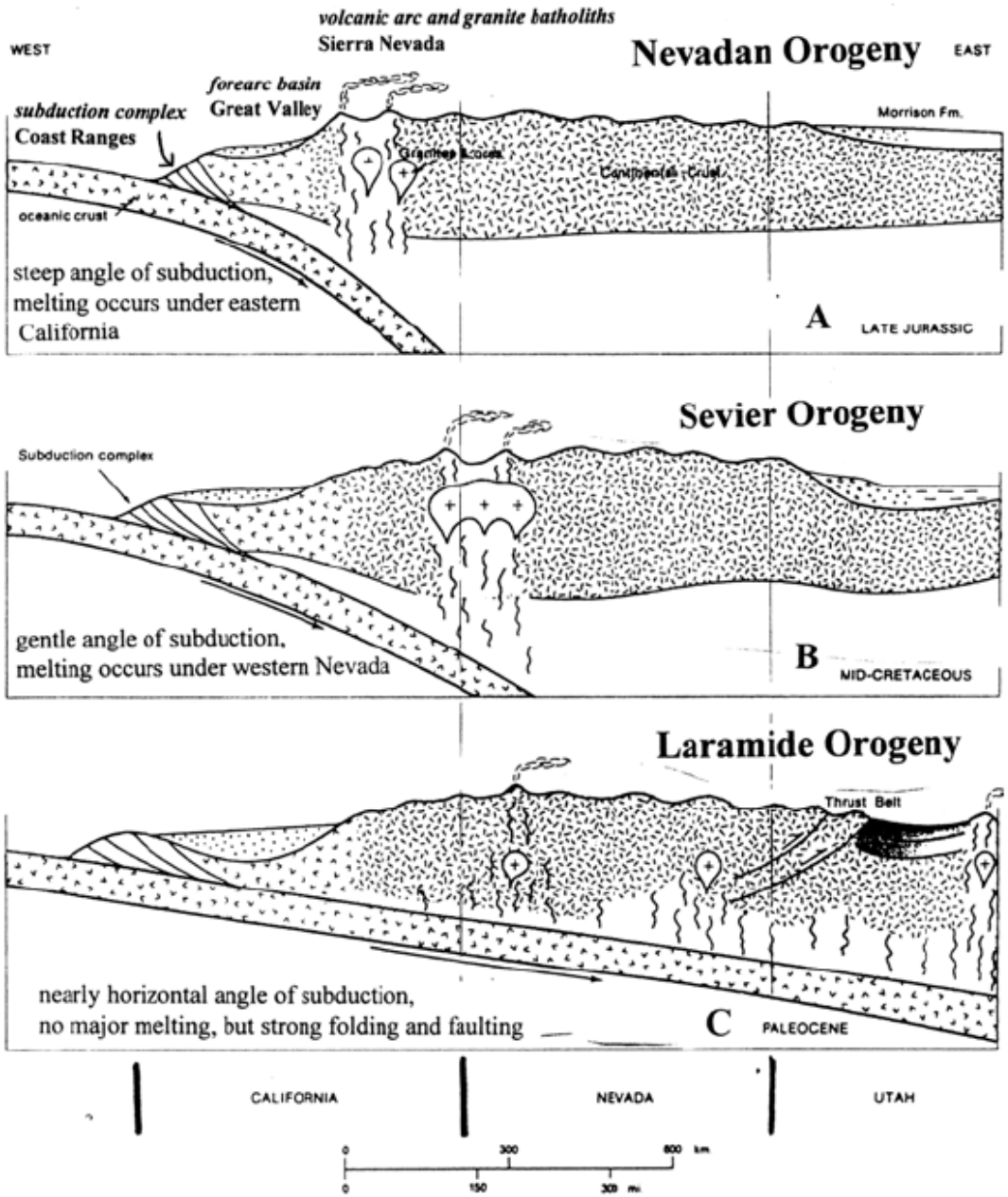
Nevadan – emplacements of large granite batholiths, Sierra Nevada, Idaho, S. California, Coast Ranges.

Sevier – Shallower sub-duction angle = igneous activity moves eastward.

Laramide – "Rocky Mts." – east of Sevier Orogeny – Cretaceous – Tertiary Peri



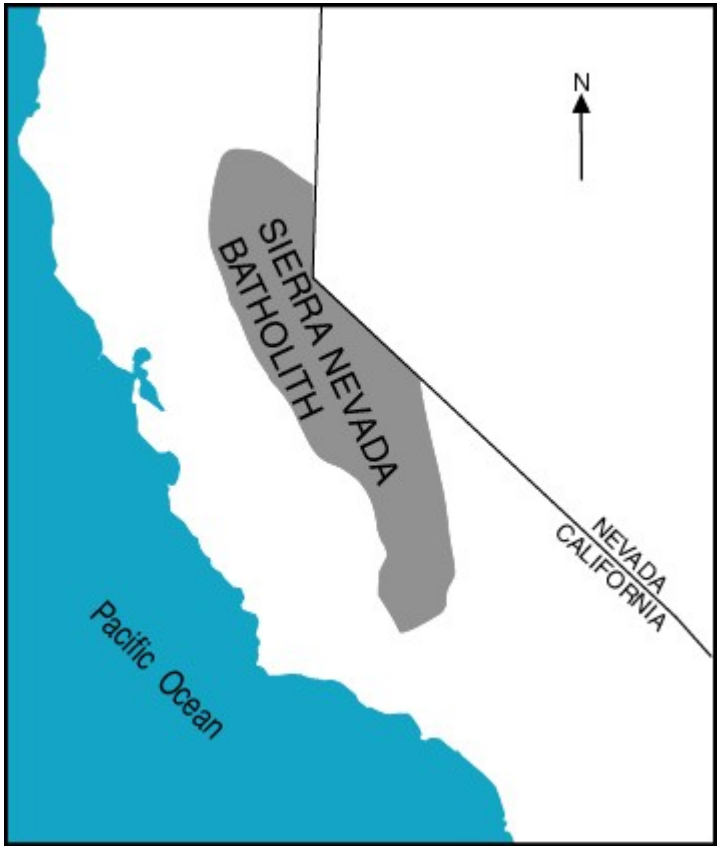
"Cordilleran" style of arc terrane accretion onto a continental land mass. Continued subduction transports the arc terrane to the margin of the continent where it is too buoyant to be subducted so it gets accreted to the continent

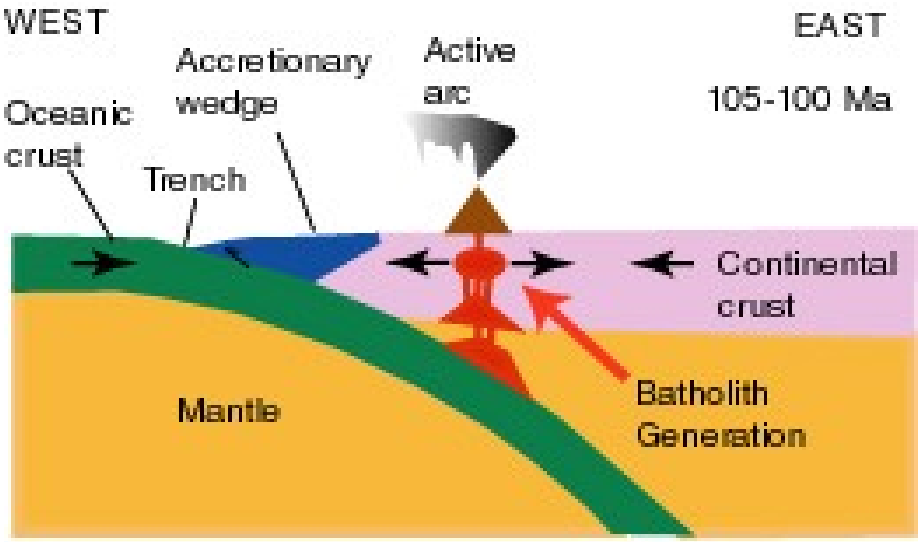

volcanic arc and granite batholiths
Sierra Nevada
WEST
Nevadan Orogeny
EAST
forearc basin
Great Valley
subduction complex
Coast Ranges
Morrison Fm.
oceanic crust
steep angle of subduction,
melting occurs under eastern
California
A
LATE JURASSIC
Sevier Orogeny
Subduction complex
gentle angle of subduction,
melting occurs under western Nevada
B
MID-CRETACEOUS
Laramide Orogeny
Thrust Belt
nearly horizontal angle of subduction,
no major melting, but strong folding and faulting
C
PALEOCENE
CALIFORNIA
NEVADA
UTAH
0
300
600 km
0
150
300 mi

The Nevadan Orogeny

- Several Upper Jurassic Arcs Collided
- Cretaceous Franciscan Fm in the accretionary prism
- Sierra Nevada was the root zone of the arc

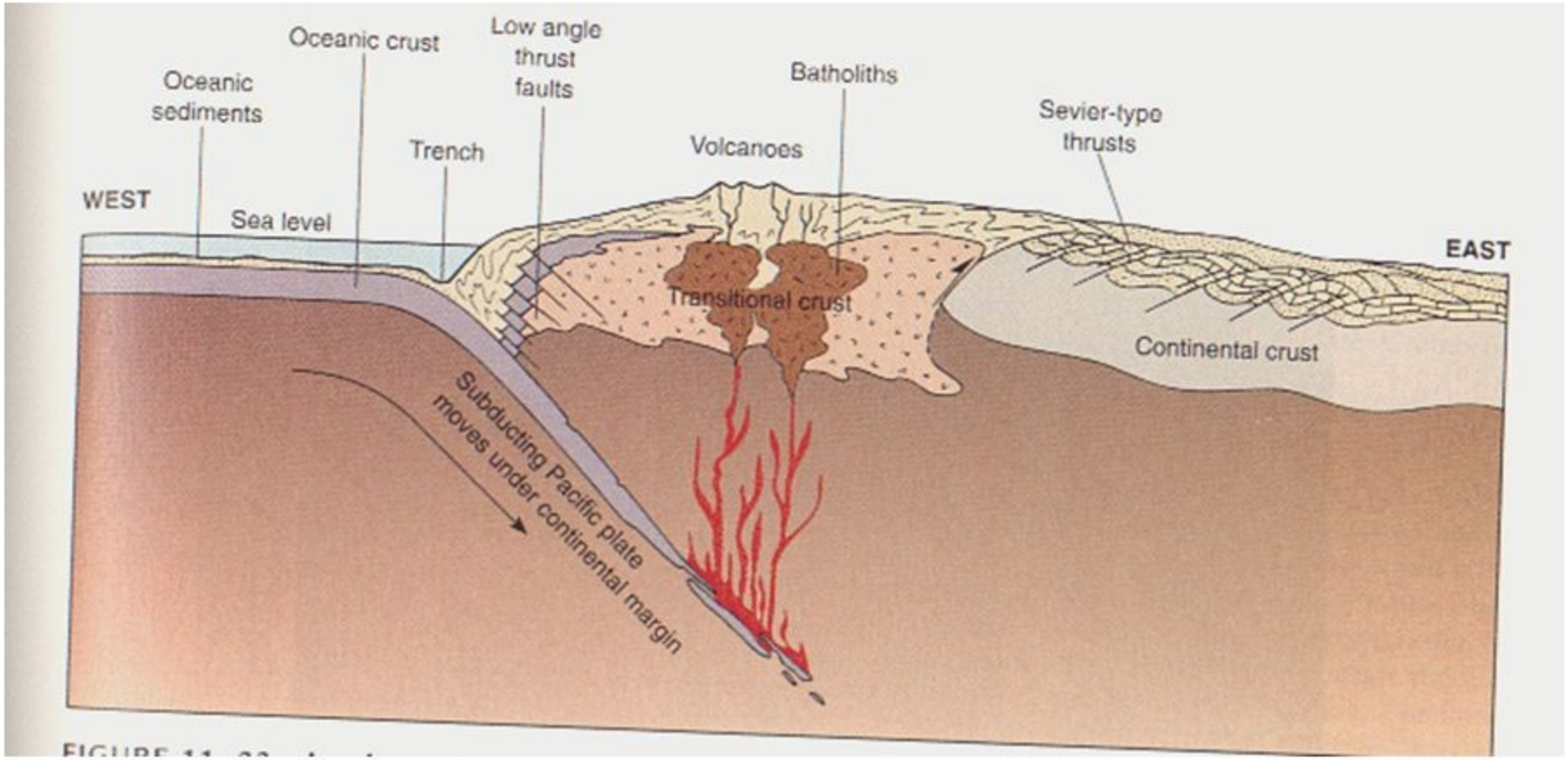
The **Nevadan Orogeny** was a major mountain building event that took place along the western edge of ancient North America between the **Mid to Late Jurassic** (between about 155 and 145 million years ago). In comparison with other orogenic events, it appears that the Nevadan Orogeny occurred **rather quickly** (10 million years). During the **early stages** of orogenesis an "**Andean type**" continental **magmatic arc** developed due to subduction of the **Farallon oceanic plate** beneath the North American Plate. The **latter stages** of orogenesis, in contrast, saw **multiple oceanic arc terranes accreted** onto the western margin of North America in a "**Cordilleran type**" accretionary orogen. **Deformation** related to the accretion of these volcanic arc terranes is mostly **limited to the western regions** of the resulting mountain ranges (**Klamath Mountain range and Sierra Nevada**) and is absent from the eastern regions. The massive series of **exposed batholiths** that currently make up **most of the high Sierra Nevada** was formed during this event. **Due to the steep angle** of the subducted plate, these were located relatively **close to continent's edge**.

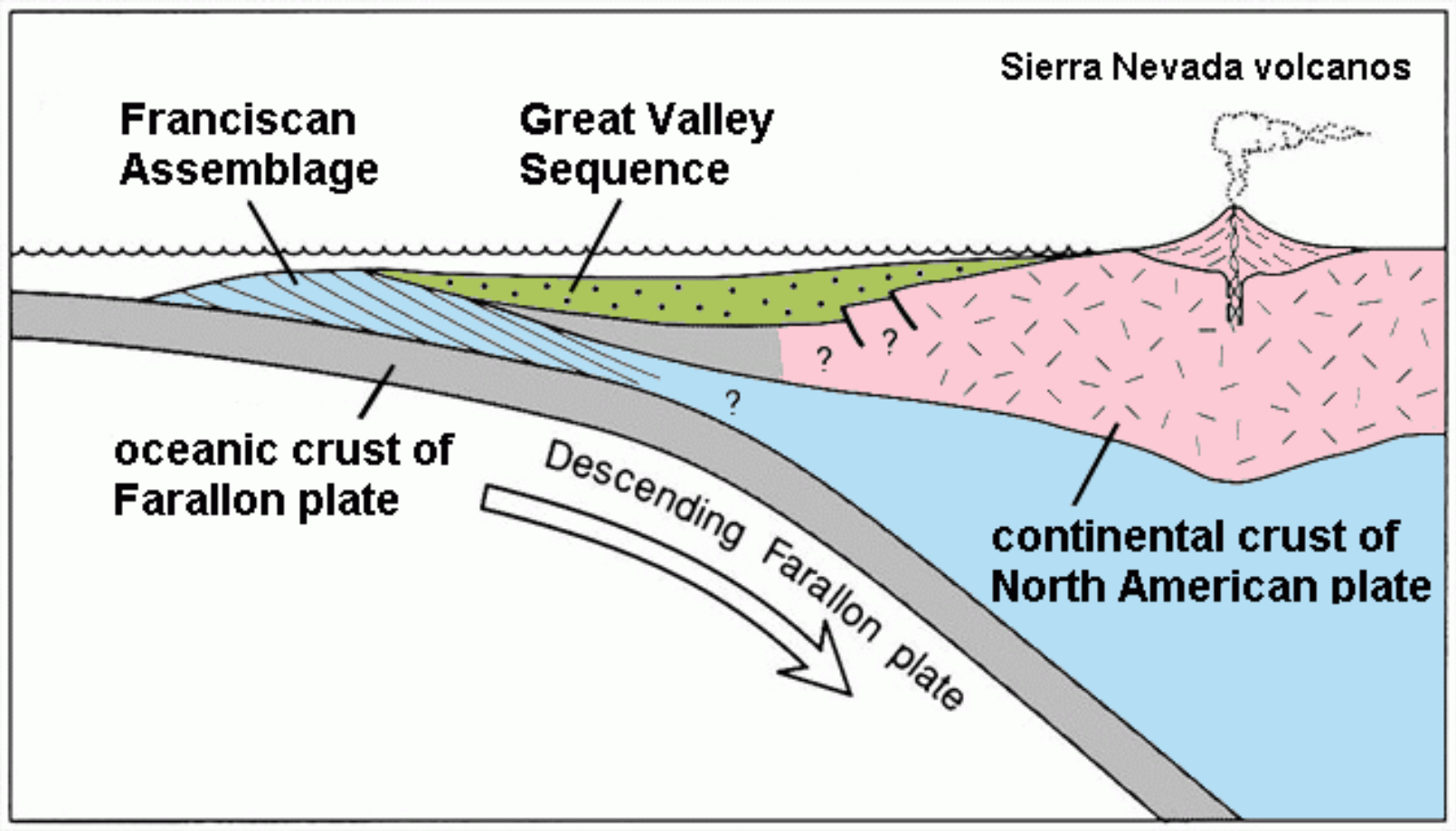




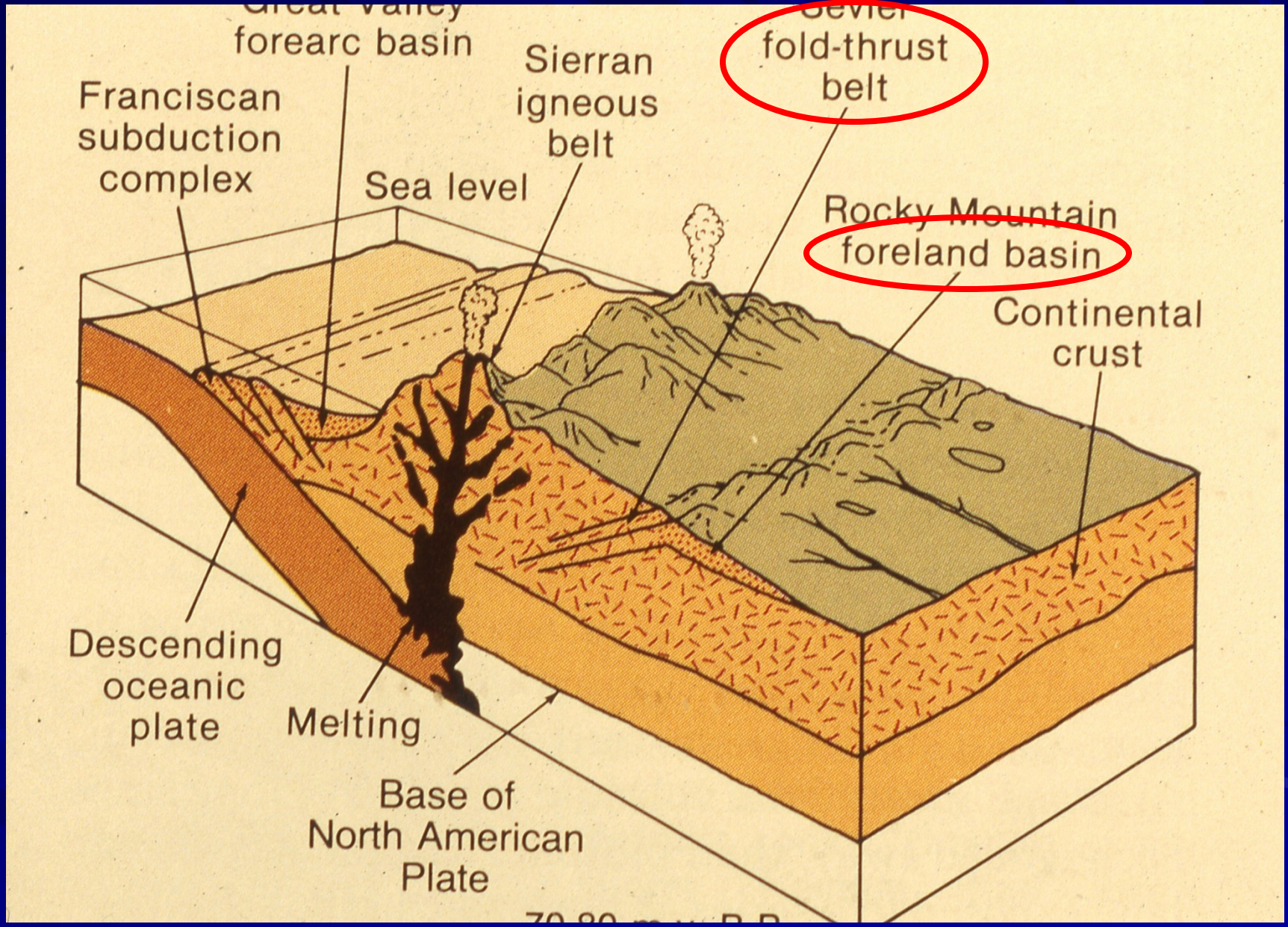
Modified from Tobisch et al., 1995

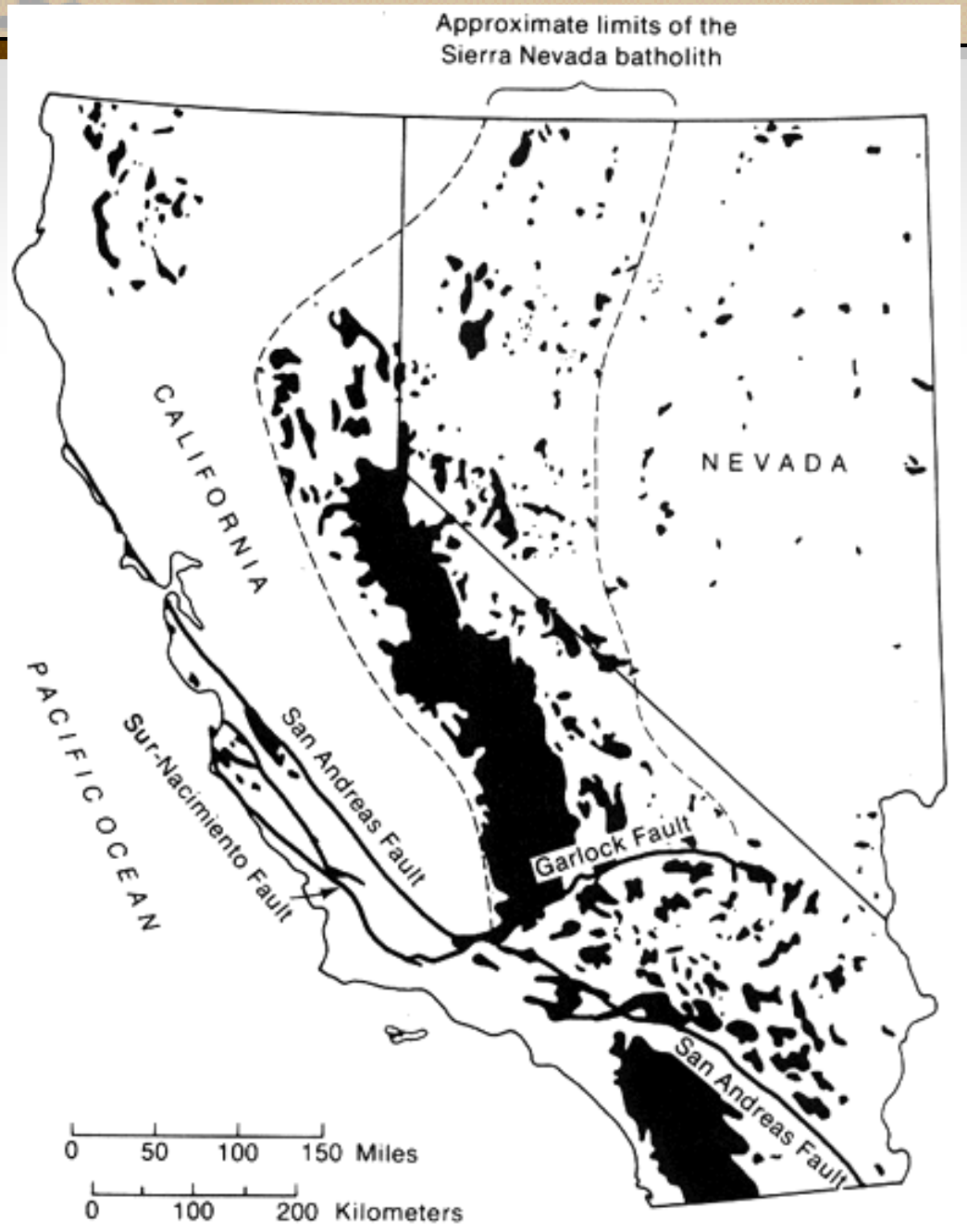
This Late Jurassic deformation took place in the west, resulting in the NEVADAN OROGENY - the results of which (mainly metamorphosed greywackes - Fig. 13.19) can be seen in California and Nevada.





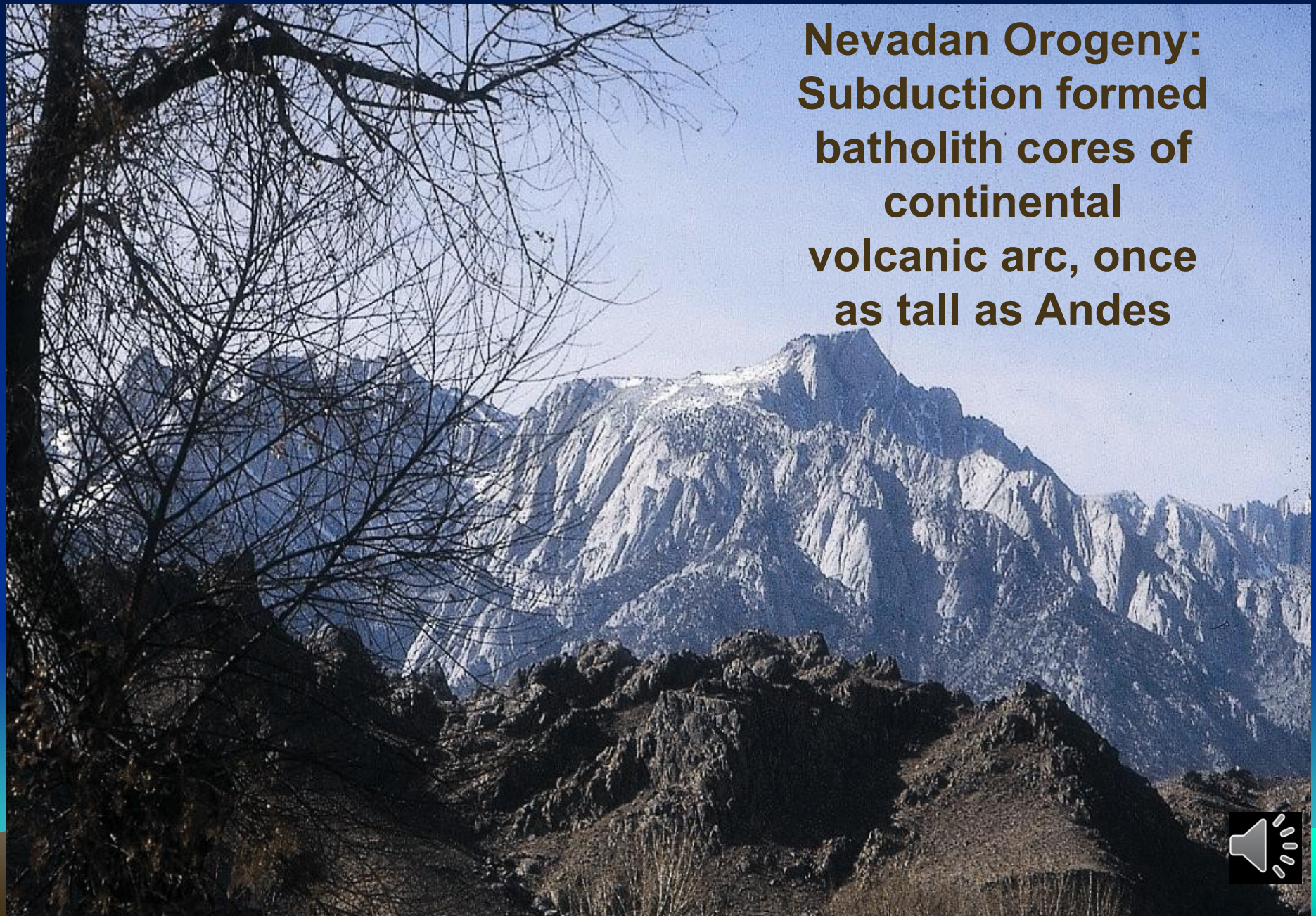
The **Franciscan Complex** is an assemblage of metamorphosed and deformed sediments and ophiolites, associated with **east-dipping subduction** zone. Although most of the Franciscan is Early/Late Jurassic through Cretaceous in age (150-66 Ma),[some Franciscan rocks are as old as early Jurassic (180-190 Ma) age and as young as Miocene (15 Ma). As oceanic crust descended beneath the continent, ocean floor basalt and sediments were subducted and then tectonically underplated to the upper plate.[10] This resulted in **widespread deformation** with the **generation of thrust faults** and **folding**, and caused **high pressure-low temperature regional metamorphism**. In the **Miocene**, the Farallon-Pacific spreading center reached the Franciscan trench and the relative motion between Pacific-North America caused the **initiation of the San Andreas Fault**.


forearc basin
Franciscan subduction complex
Sierran igneous belt
fold-thrust belt
Sea level
Rocky Mountain foreland basin
Continental crust
Descending oceanic plate
Melting
Base of North American Plate



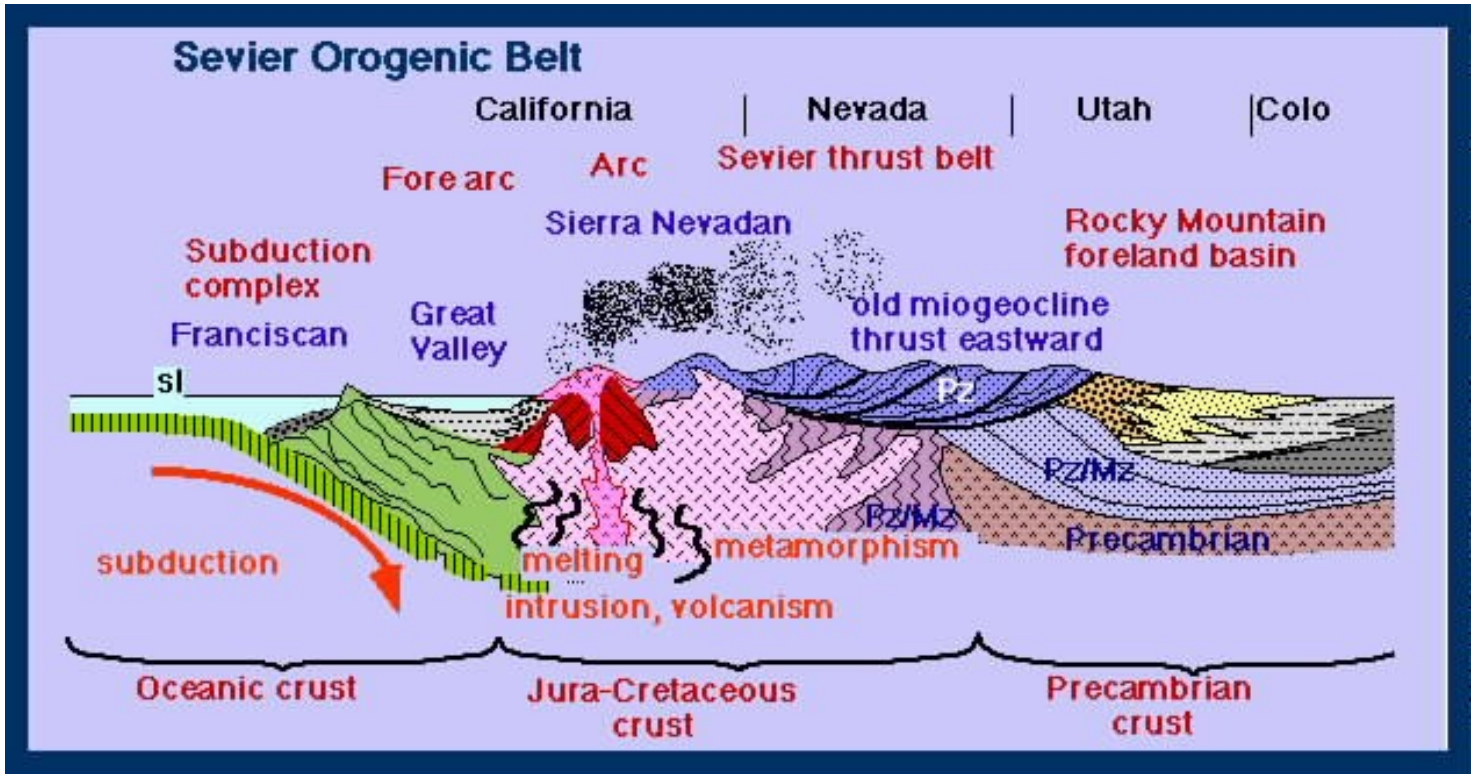
Evidence for the Nevadan orogeny includes the formation of vast Late Jurassic and Early Cretaceous **batholiths** (large bodies of igneous rock that formed underground) in southern California, the **Sierra Nevada**, the Coast Ranges, Idaho, and British Columbia. The name is derived from the changes that occurred in the Sierra Nevada range of eastern California.

Sierra Nevada Mountains



Sevier Orogen (80 Sevier Orogen (50- 130 Ma)

- Fold-thrust belt behind the arc
- Eastward directed thin skinned thrusts
- Franciscan complex and Great Valley fore arc basins
- Cretaceous
- Batholithic intrusions



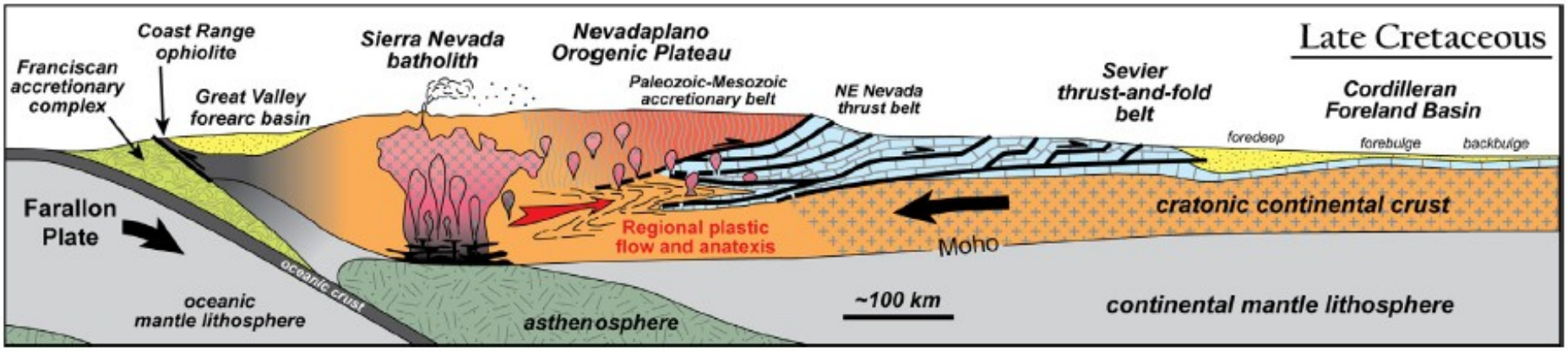
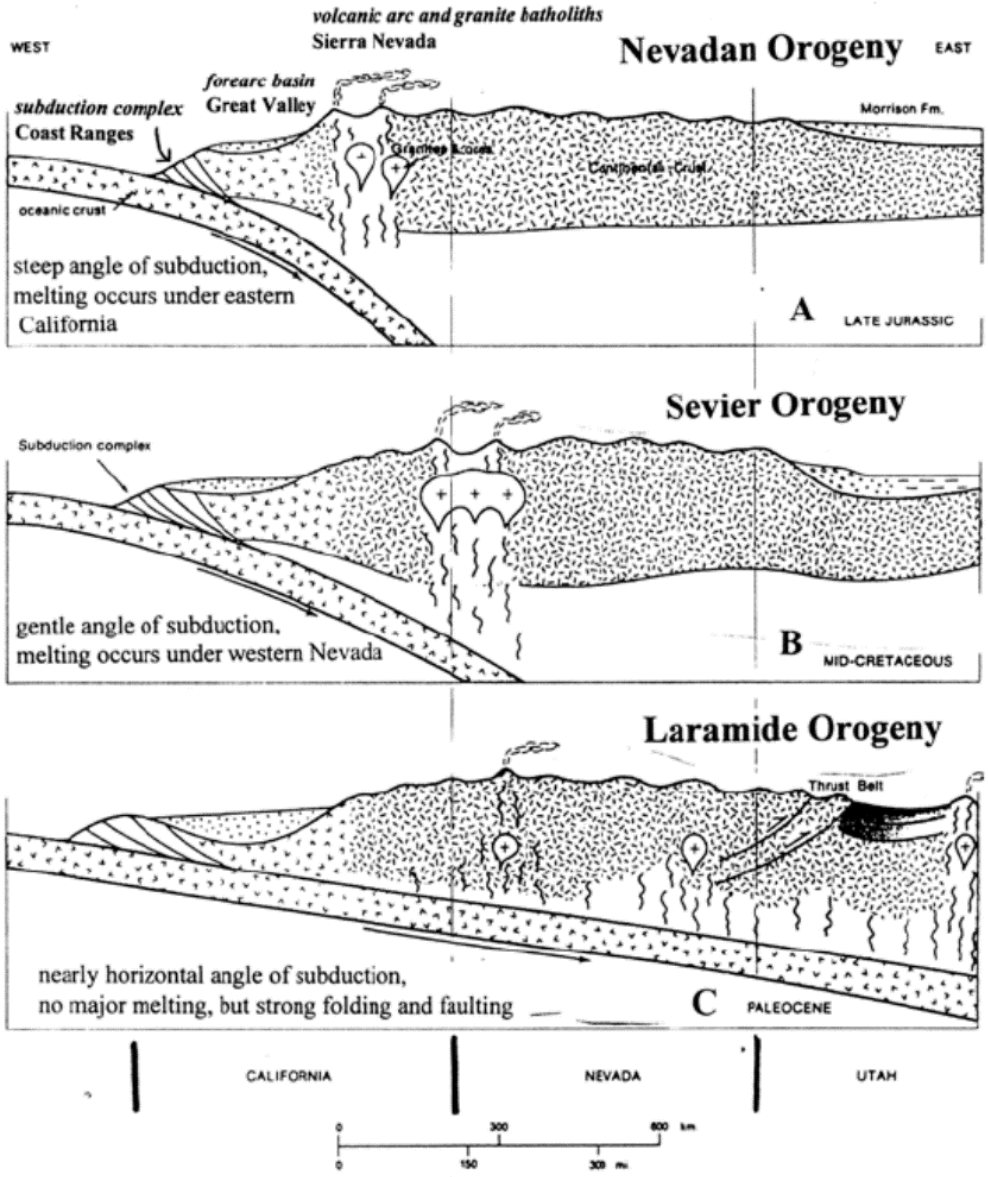


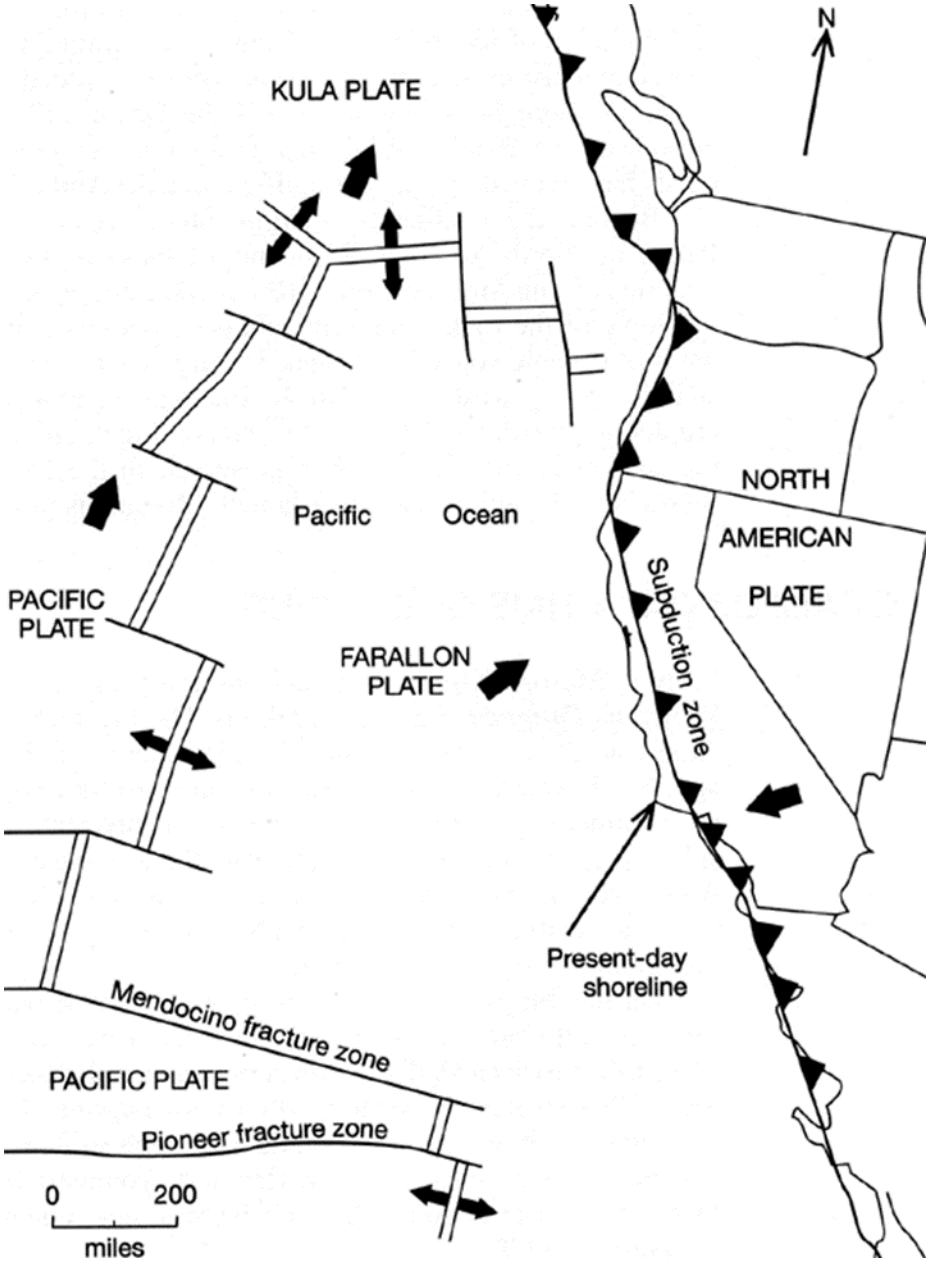
Fig. 5 Schematic Late Cretaceous cross-section of the Central Cordillera, showing the relationship between the Sevier fold-and-thrust belt and Cordilleran foreland basin on the east, metamorphic and igneous rocks of the hinterland, Sierra Nevada batholith, Great Valley forearc basin, and Franciscan accretionary complex on the west.


volcanic arc and granite batholiths
Sierra Nevada
WEST
Nevadan Orogeny
EAST
forearc basin
Great Valley
subduction complex
Coast Ranges
Morrison Fm.
oceanic crust
steep angle of subduction,
melting occurs under eastern
California
A
LATE JURASSIC
Sevier Orogeny
Subduction complex
gentle angle of subduction,
melting occurs under western Nevada
B
MID-CRETACEOUS
Laramide Orogeny
Thrust Belt
nearly horizontal angle of subduction,
no major melting, but strong folding and faulting
C
PALEOCENE
CALIFORNIA
NEVADA
UTAH

The **Sevier orogeny** was the result of convergent boundary tectonic activity, and deformation occurred from approximately 160 million years (Ma) ago to around 50 Ma. This orogeny was caused by the **subduction of the oceanic Farallon Plate** underneath the continental North American Plate.

The **Sevier orogeny partially overlapped** in time and space **with the Laramide** orogeny. There is evidence that suggests late **Sevier faults were active during the early Laramide**. Sevier thrusts may have remained **active until the Eocene** while **Laramide** deformation **began in the Late Cretaceous**

In general the Sevier orogeny defines **compressional event** that took advantage of **weak bedding planes in overlying Paleozoic and Mesozoic sedimentary rock**. As the crust was shortened, pressure was transferred eastward along the weak sedimentary layers, producing **"thin-skinned" thrust faults** that generally get **younger to the east**. In contrast, the **Laramide orogeny** produced **"basement-cored" uplifts** that often took advantage of pre-existing **faults** that **formed** during **rifting** in the late **Precambrian** during the breakup of the supercontinent Rodinia or during the Ancestral Rocky Mountains orogeny


N
KULA PLATE
Pacific Ocean
NORTH AMERICAN PLATE
Subduction zone
PACIFIC PLATE
FARALLON PLATE
Present-day shoreline
Mendocino fracture zone
PACIFIC PLATE
Pioneer fracture zone
0 200
miles

The Sevier Fold and Thrust Belt extends from southern California near the Mexican border to Canada

Location of the Sevier Fold and Thrust Belt (highlighted in red). After Yonkee and Weil (2015)

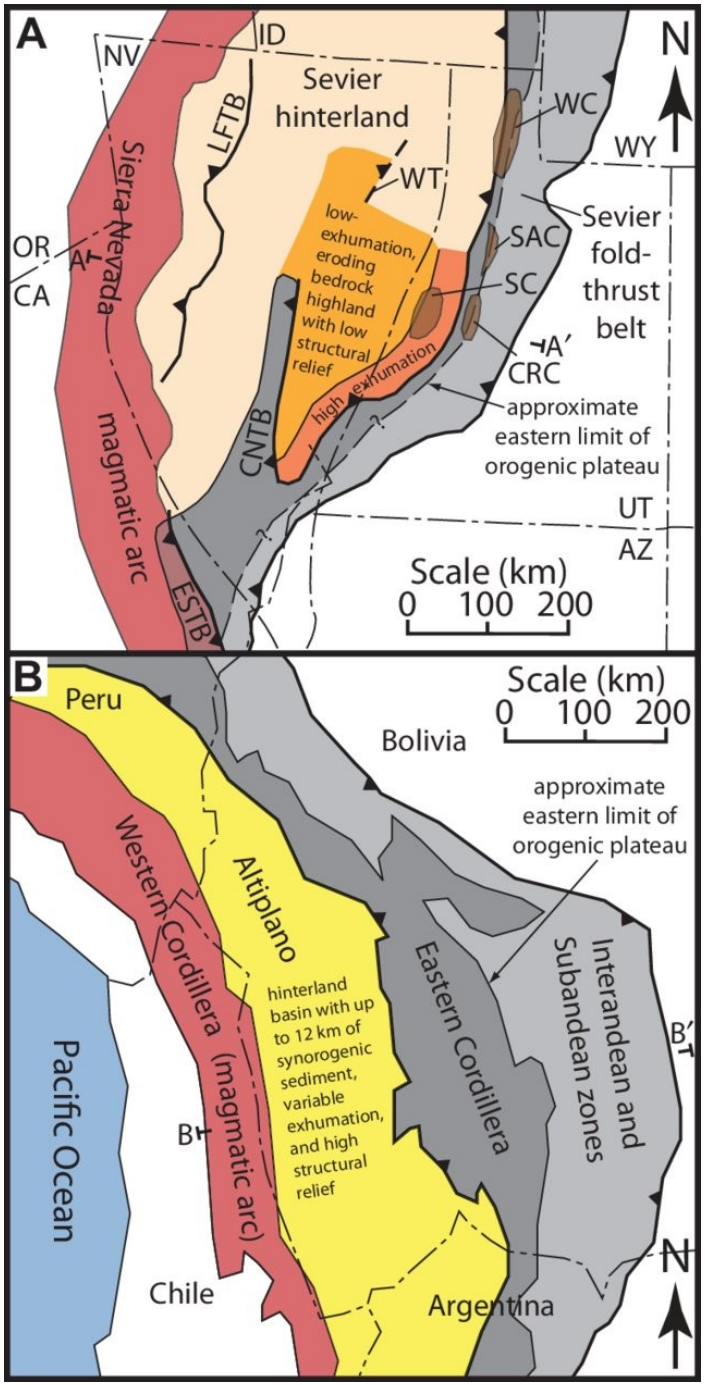


Figure 3. (A) Generalized geologic map of the Sevier orogenic belt, approximately restored for Cenozoic extension (base map modifi ed from DeCelles, 2004). Mesozoic thrust systems: LFTB—Luning-Fencemaker thrust belt, CNTB—central Nevada thrust belt, ESTB—eastern Sierra thrust belt, WT—Windermere thrust. Structural culminations in Utah: SC— Sevier culmination, CRC—Canyon Range culmination, SAC—Santaquin culmination, WC—Wasatch culmination. Approximate eastern limit of orogenic plateau based on position of Wasatch hingeline and positions of culminations (queried where unknown) (e.g., DeCelles, 1994, 2004; DeCelles and Coogan, 2006). Line A–A′ delineates approximate crosssection line of Figure 4A. Note that exhumation magnitudes outside of the map area in this study are not quantifi ed.

Luning-Fencemaker fold and thrust belt was active from the Middle or Late Jurassic through the. Early Cretaceous – Nevadan orogeny

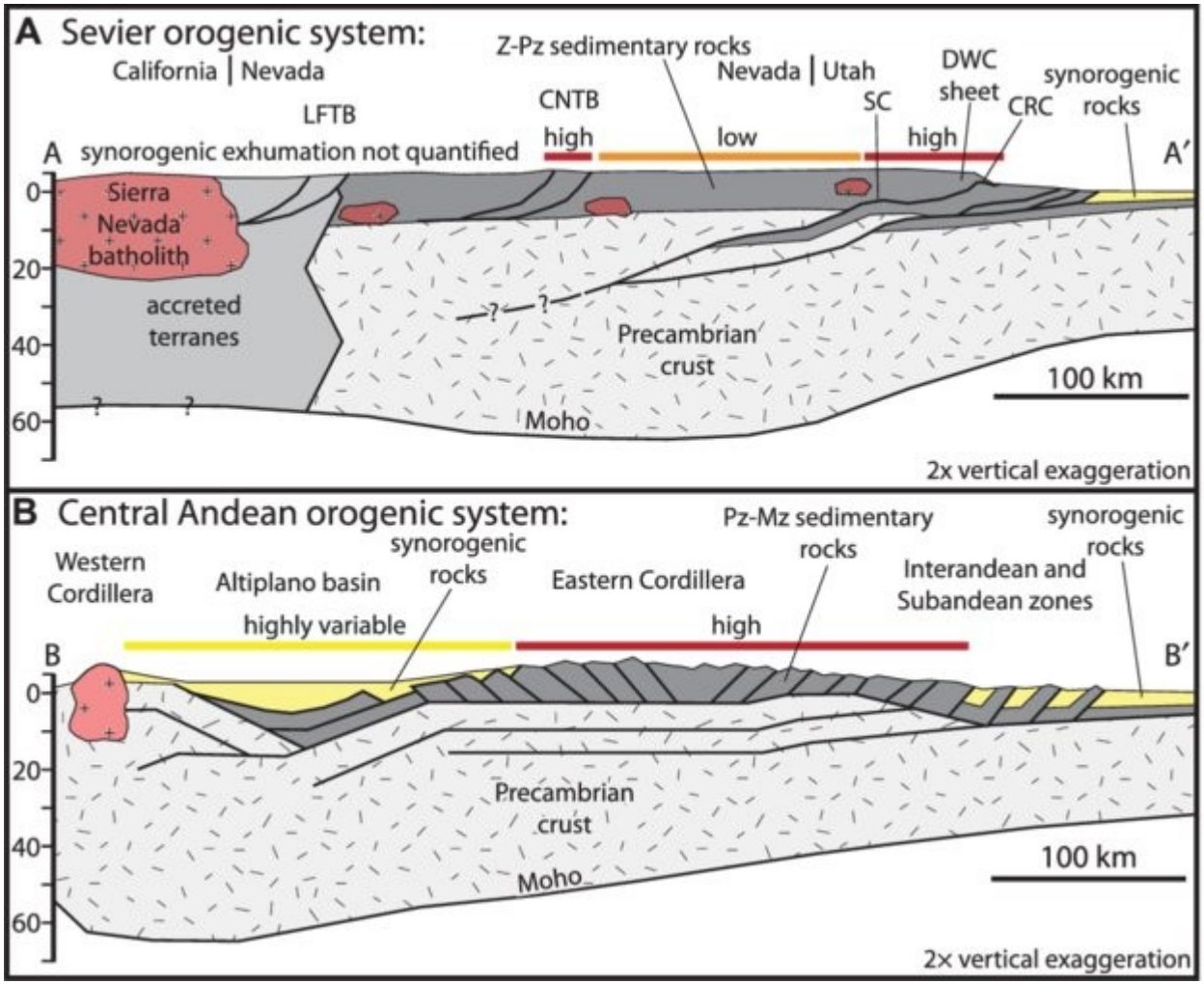
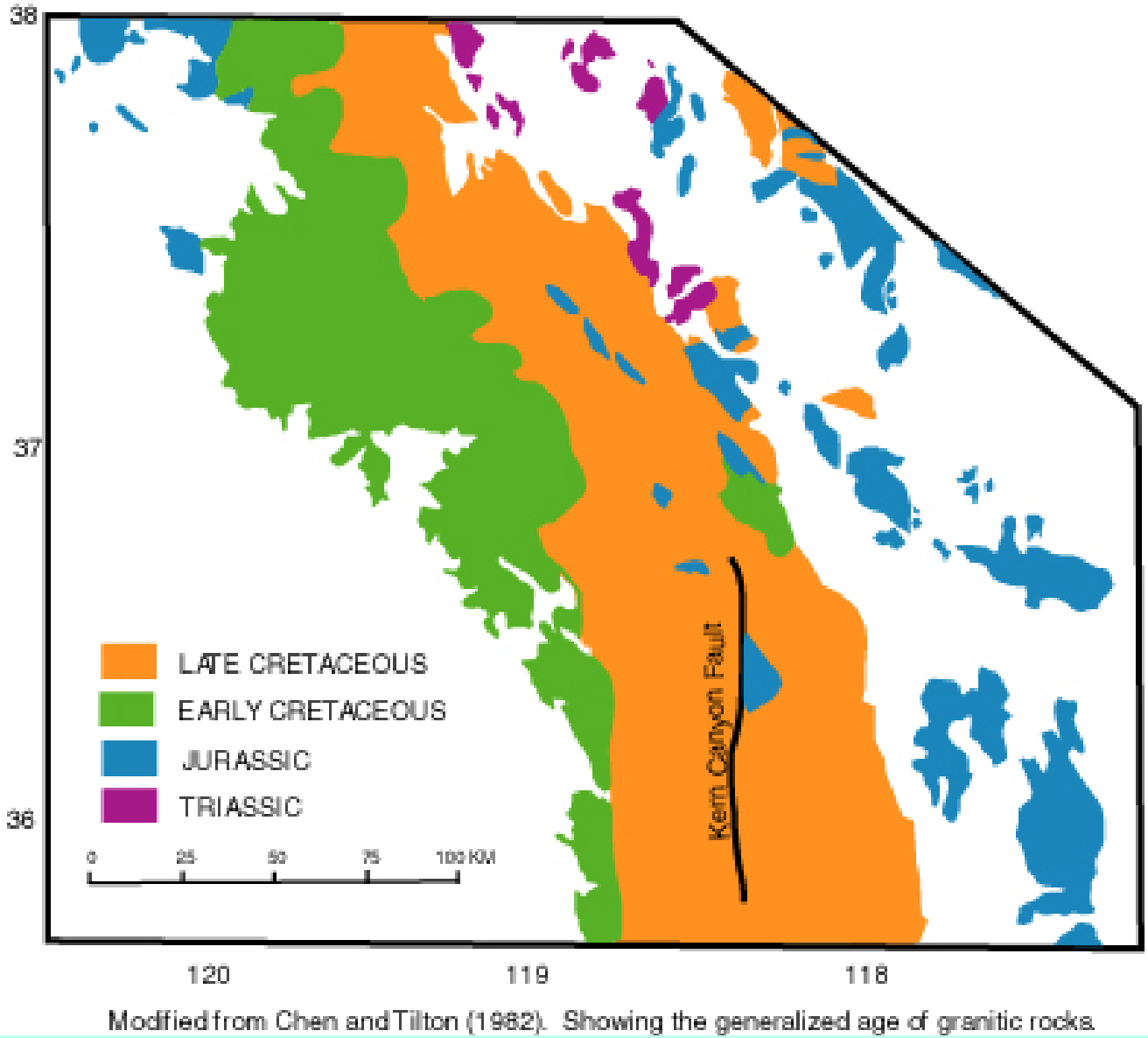


Figure 4. Schematic cross sections comparing deformation geometries and exhumation patterns between the Sevier and central Andean orogenic systems. Approximate cross-section lines are shown in Figure 3. (A) Schematic preextensional geometry of the Sevier orogenic system, modifi ed from Allmendinger et al. (1987) and Best et al. (2009). Placements of individual structures and plutons are largely schematic, and are meant to show only general locations. Eastern limit of high topography is placed above the Canyon Range culmination (DeCelles and Coogan, 2006). Generalized exhumation magnitudes are shown by red and orange bars. LFTB—Luning-Fencemaker thrust belt, CNTB—central Nevada thrust belt, SC—Sevier culmination, CRC—Canyon Range culmination, DWC—Delamar–Wah Wah– Canyon Range, Z–Pz—Neoproterozoic–Paleozoic. (B) Schematic present-day geometry of the central Andean orogenic system (modifi ed Leier et al., 2010). Generalized exhumation magnitudes are shown by red and yellow bars. Pz–Mz—Paleozoic–Mesozoic.

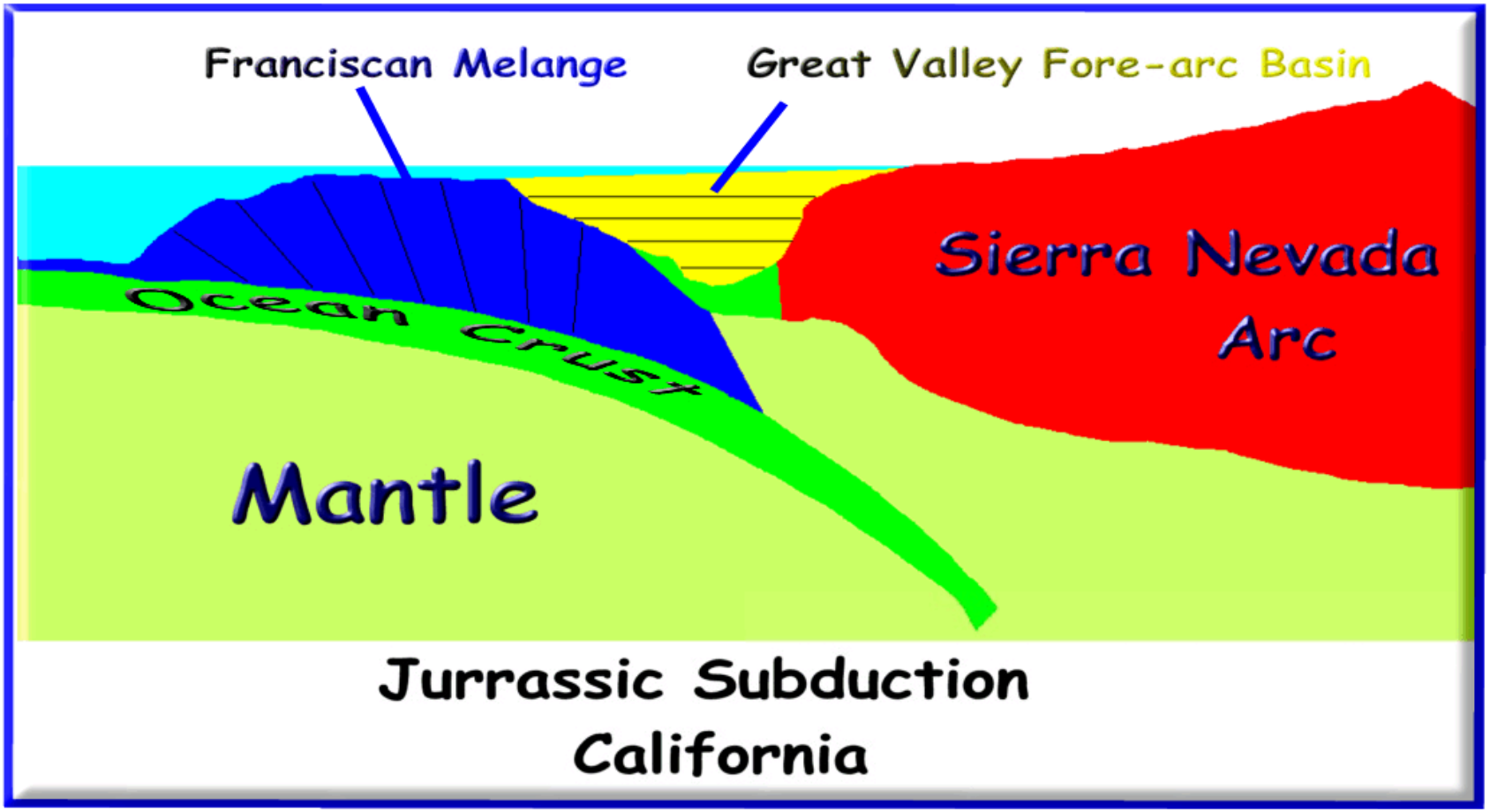


Modified from Chen and Tilton (1982). Showing the generalized age of granitic rocks.

~210 Ma on the east side of the batholith in a single, extensive Triassic sequence

186-155 Ma on both east and west margins of the batholith

125-88 Ma granitoids, which young eastward, in the axial part of the batholith



Jurrassic Subduction California

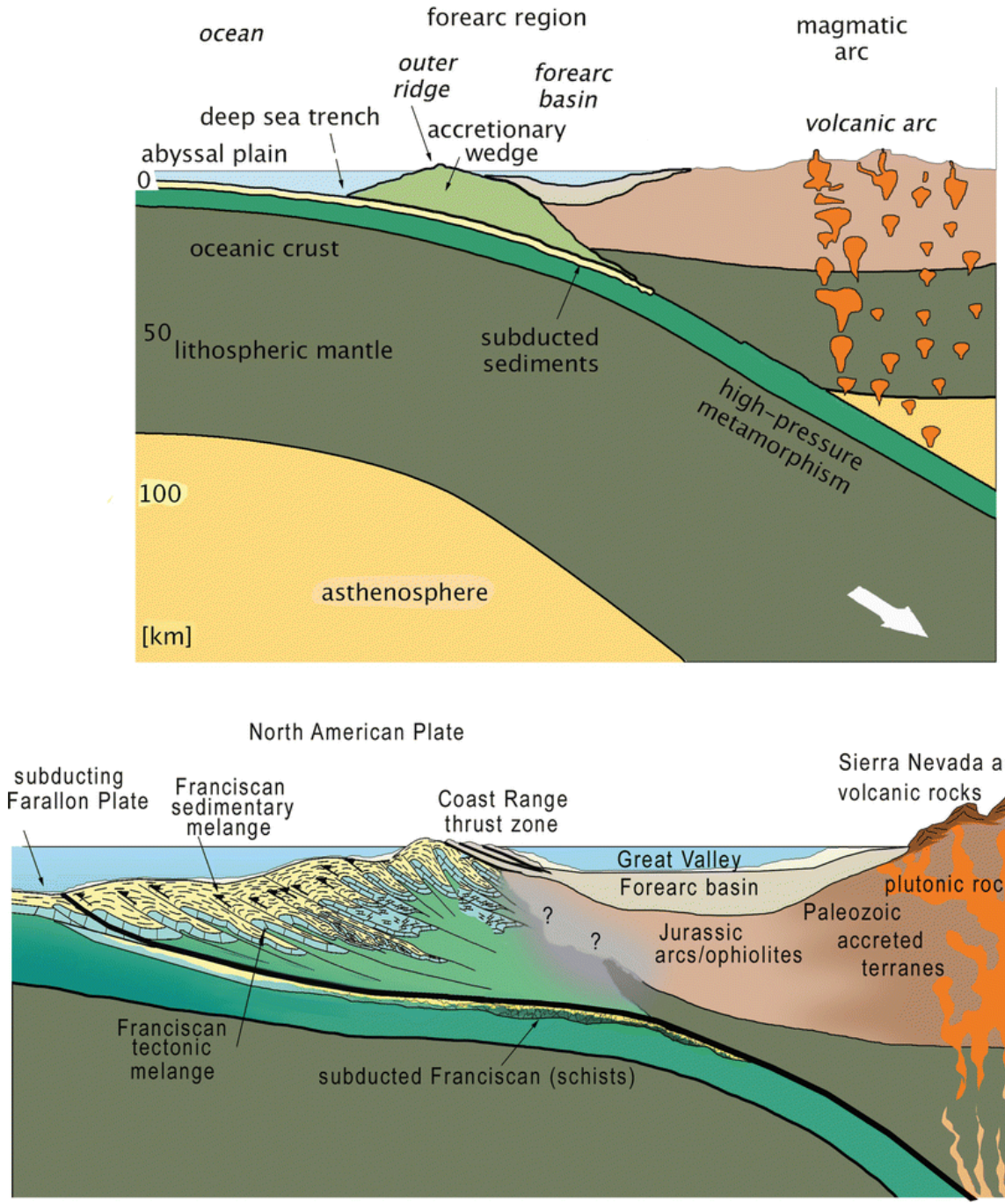
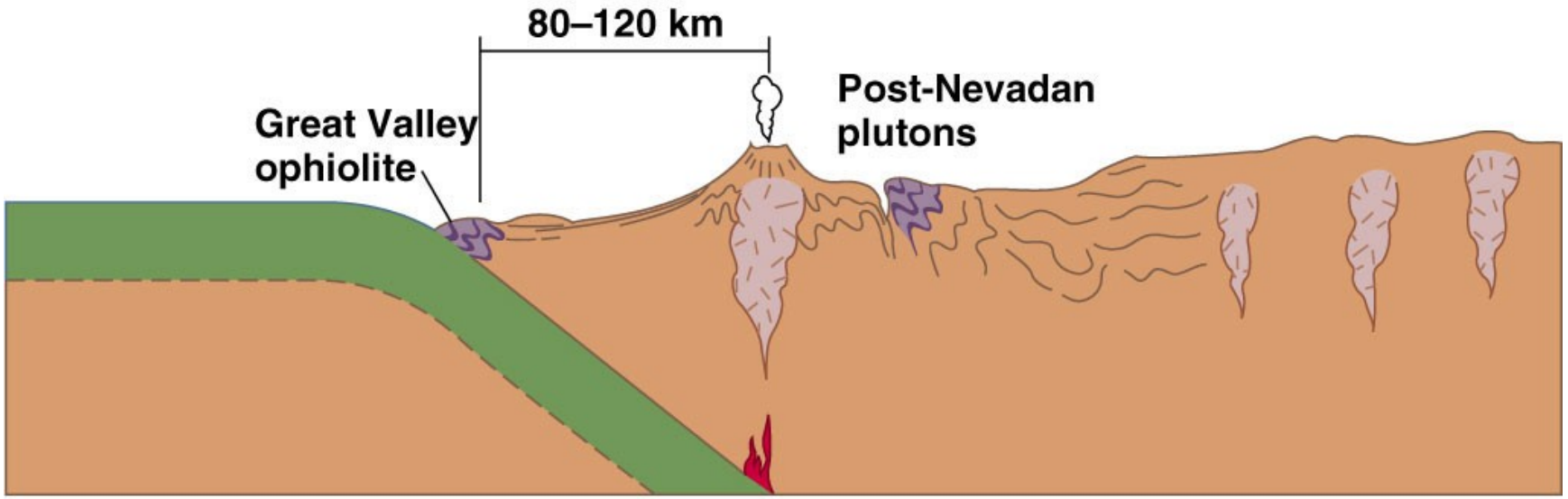
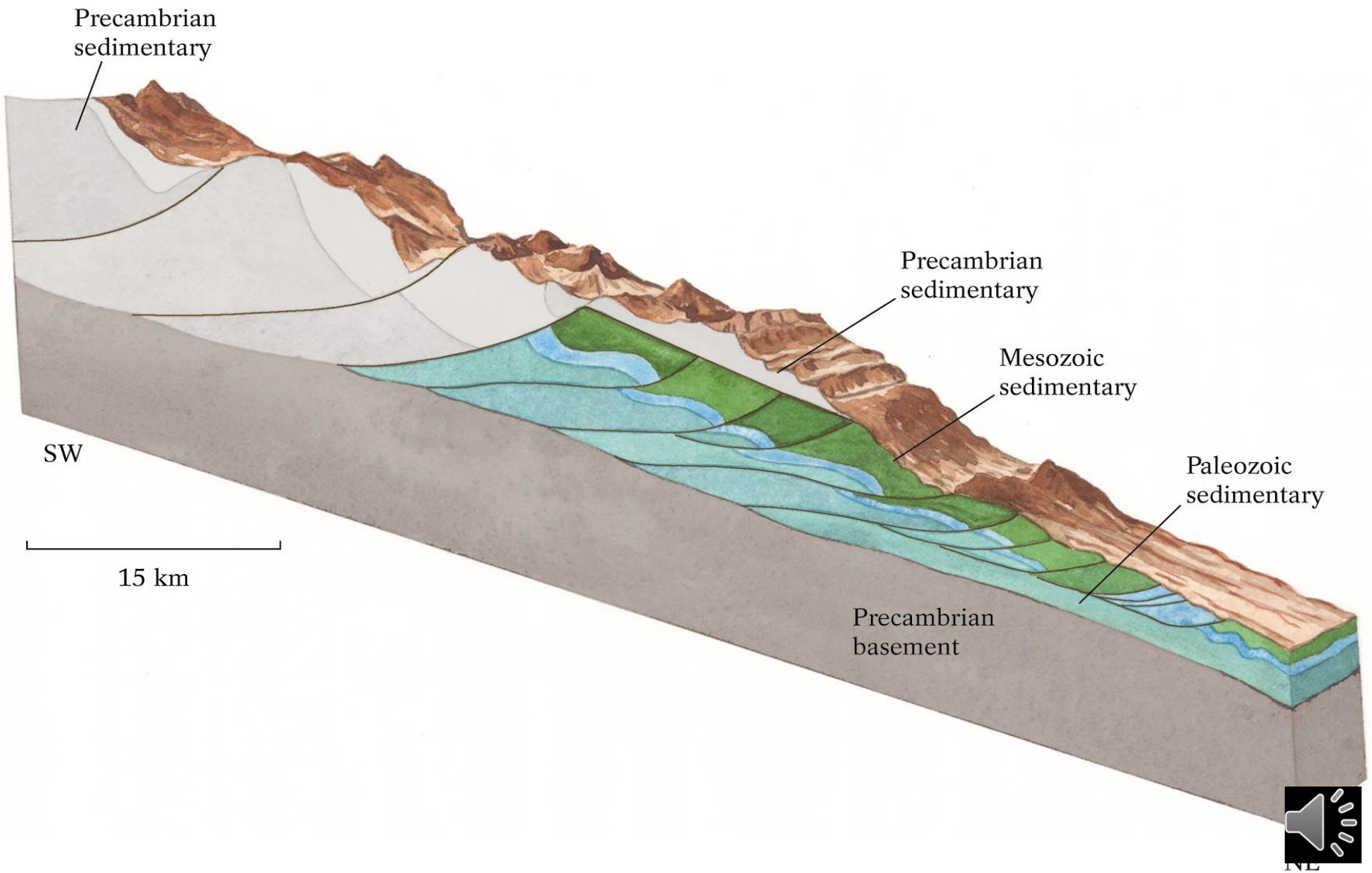


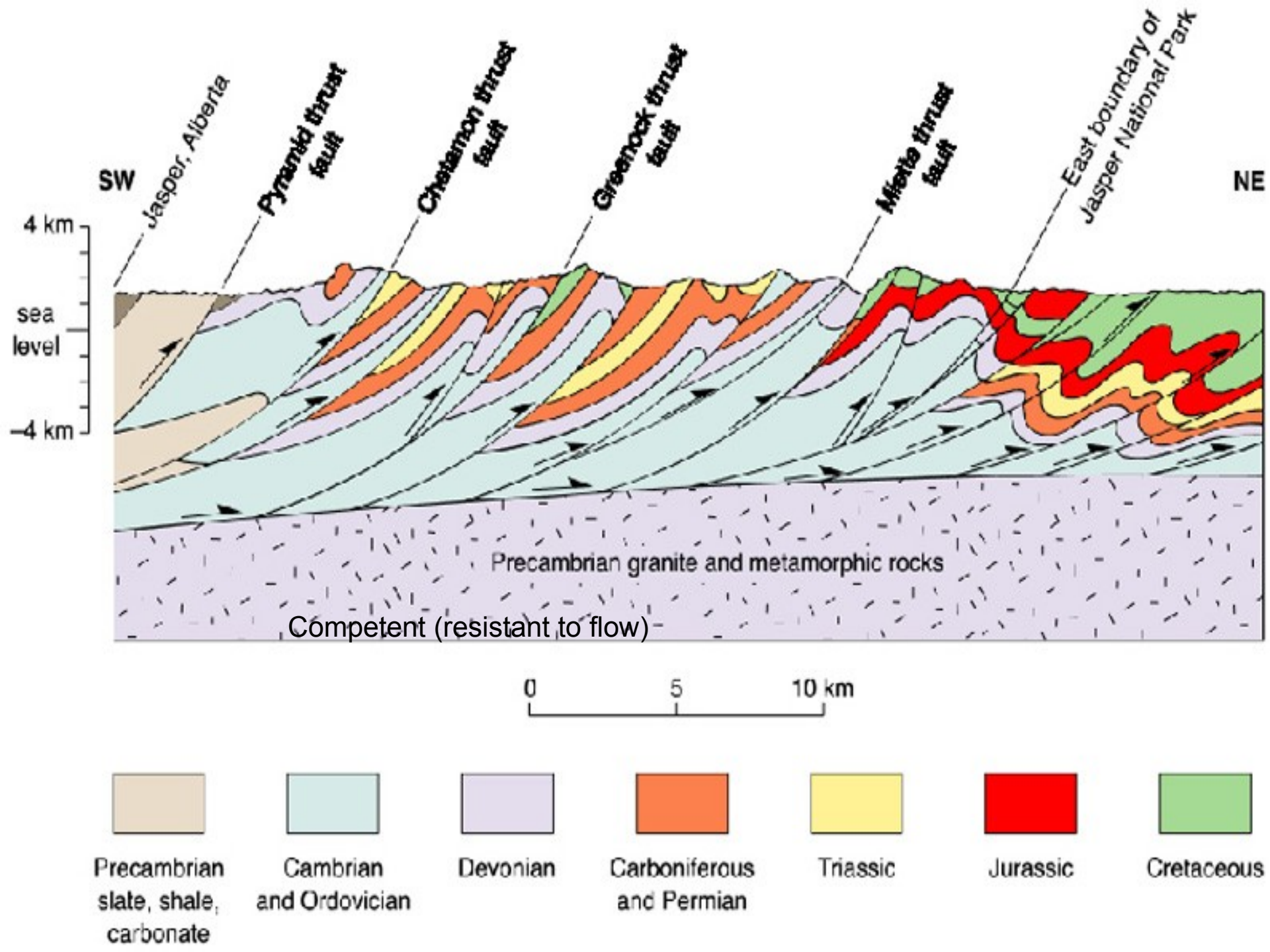
Fig. 8.5 Cross sections of the forearc region. Upper: general cross section of typical Cordilleran margin showing tectonic and sedimentary elements and geomorphic settings. Lower: details of forearc setting typical of the Late Jurassic through Paleocene of Central California showing tectonic and sedimentary setting of Franciscan and Great Valley sedimentary rocks. Light tan shows zones of active sedimentation. Note that most Franciscan deposits are bathyal to abyssal and that Great Valley deposits range from shoreline to abyssal. The contact between Franciscan and Great Valley rocks is everywhere tectonic – usually the Coast Range Fault zone. Queried areas have uncertain relations. Over long periods of geologic time, the entire forearc region became new continental crust added to western North America; Cenozoic sedimentary basins and associated volcanic rocks were developed across the forearc region during the ensuing compressional, transpressional, and transform tectonic regimes (Modified after Frisch et al. 2011)



Franciscan complex – a Late Jurassic/Early Cretaceous chaotic mixture of graywacke, volcanic breccia, siltstone, black shale, chert, pillow-basalt, and blueschist (a low temperature, high pressure metamorphic rock) resulting from the "scraping-off" of continental shelf, cont. slope, and deep sea sediments from the Farallon Plate.

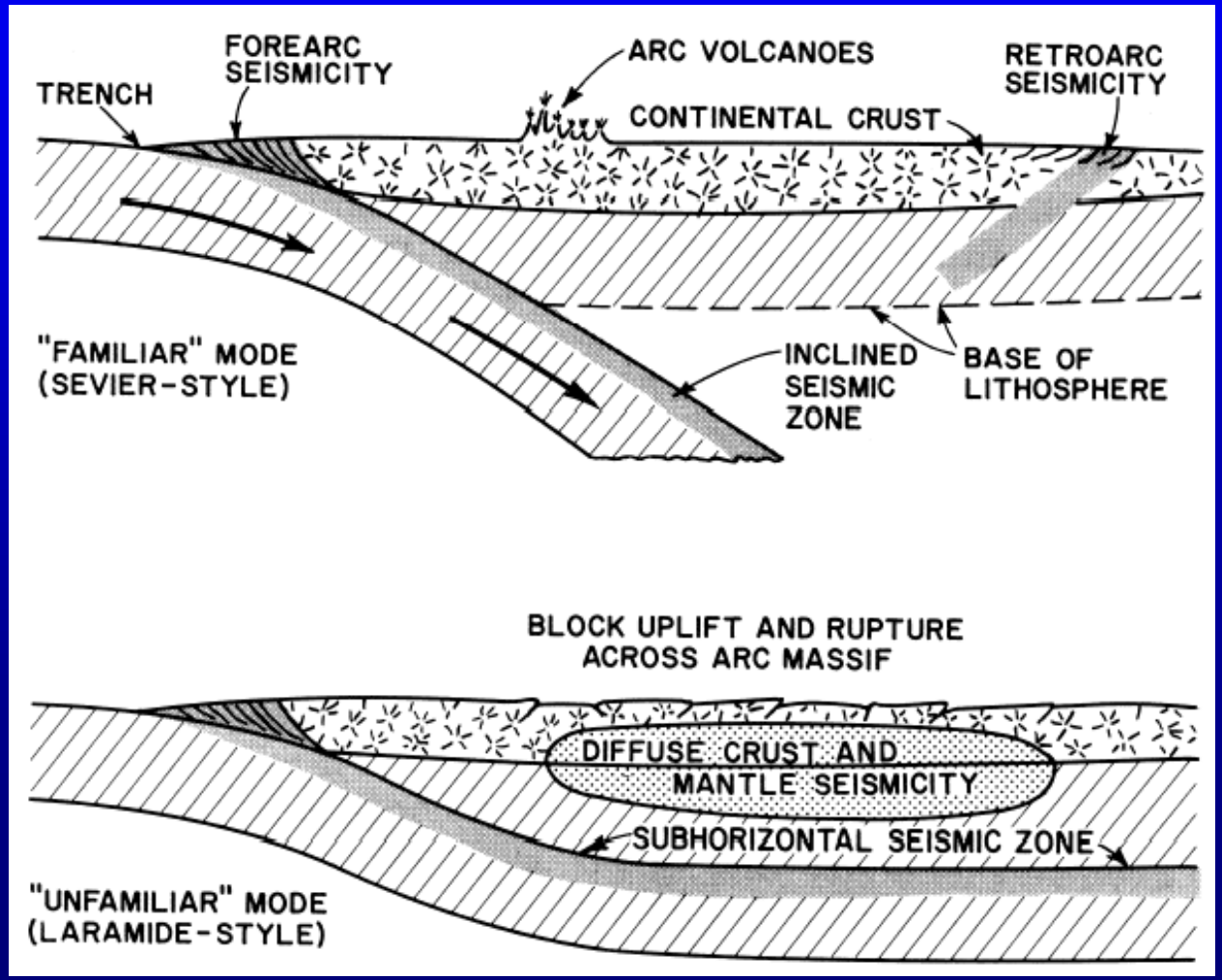
Sevier thin-skinned deformation

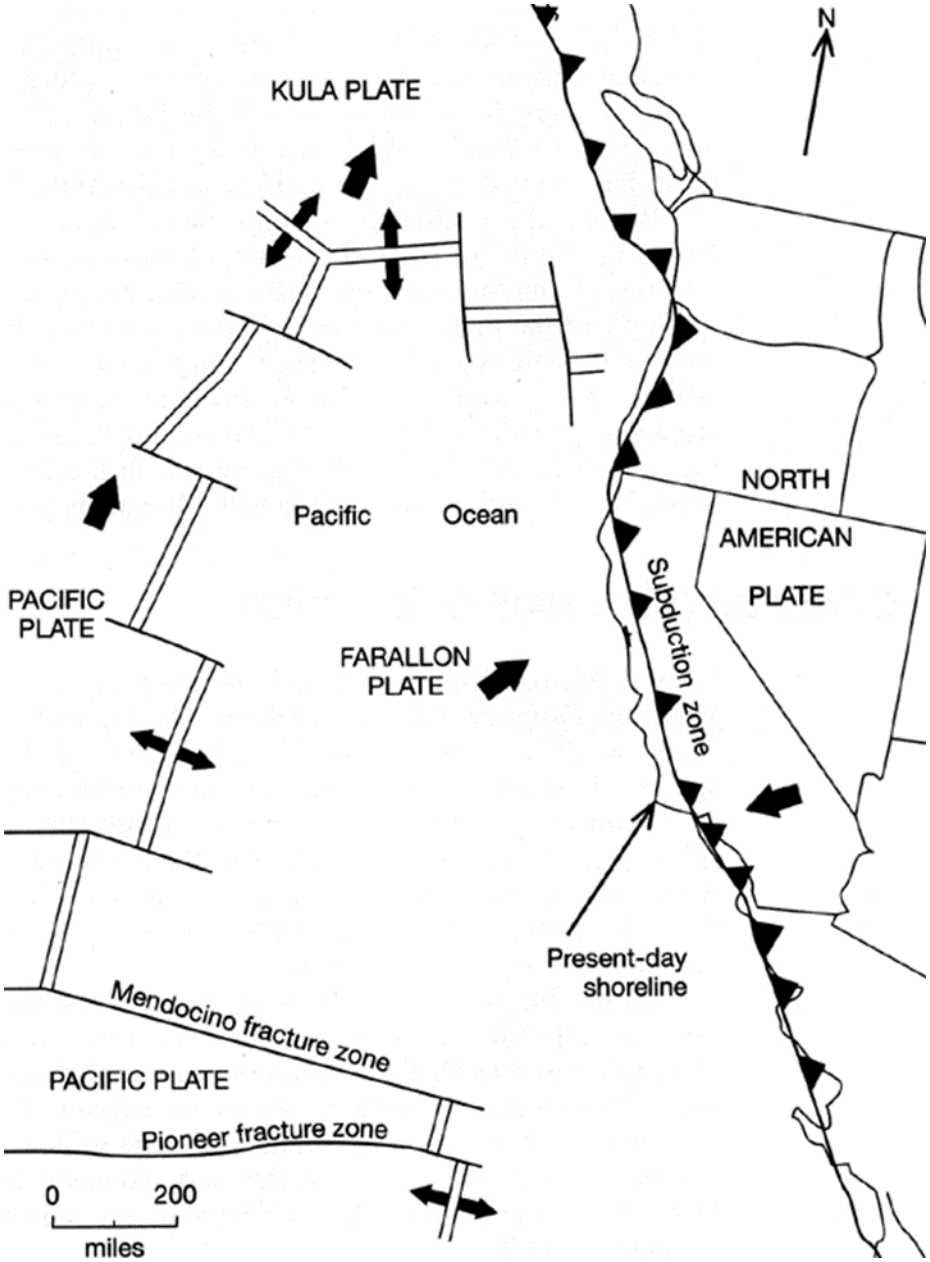


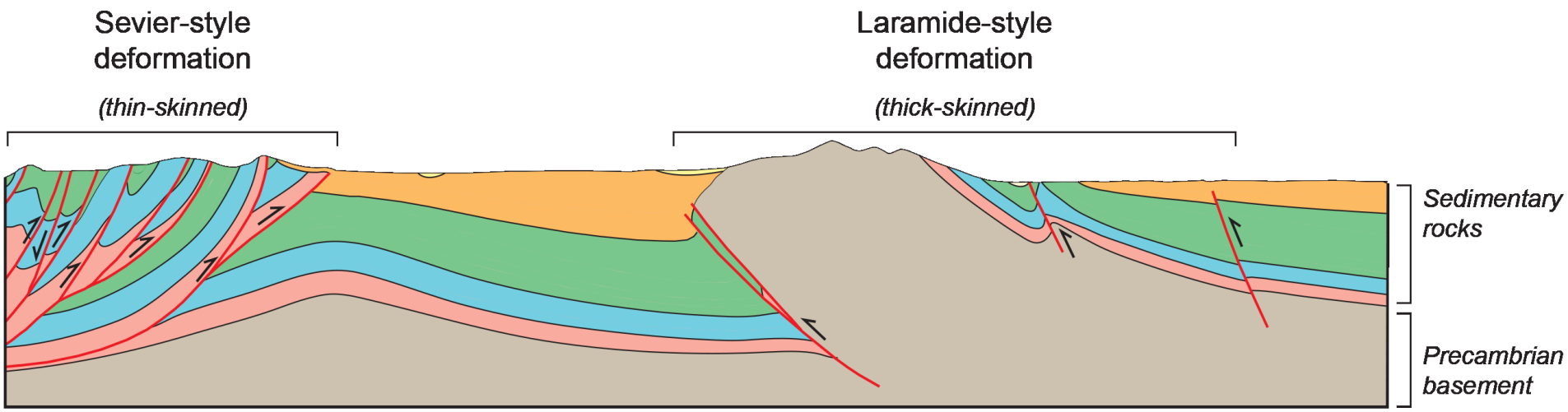

SW
NE
Jasper, Alberta
Pyramid thrust fault
Cheadamon thrust fault
Greenock thrust fault
Miette thrust fault
East boundary of Jasper National Park
4 km
sea level
–4 km
Precambrian granite and metamorphic rocks
Competent (resistant to flow)
0
5
10 km
Precambrian slate, shale, carbonate
Cambrian and Ordovician
Devonian
Carboniferous and Permian
Triassic
Jurassic
Cretaceous

~50 Ma: End of subduction

- In the Cenozoic, the slab became completely horizontal, probably due to progressive decrease in age of the subducting Farallon Plate as the ridge approached the trench. Results include end of calc-alkaline volcanism, major compressive orogeny far inland (Laramide orogeny of the Rocky Mountains) and emplacement of Pelona and related schists under Southern California




N
KULA PLATE
Pacific Ocean
NORTH AMERICAN PLATE
Subduction zone
PACIFIC PLATE
FARALLON PLATE
Present-day shoreline
Mendocino fracture zone
PACIFIC PLATE
Pioneer fracture zone
0 200
miles

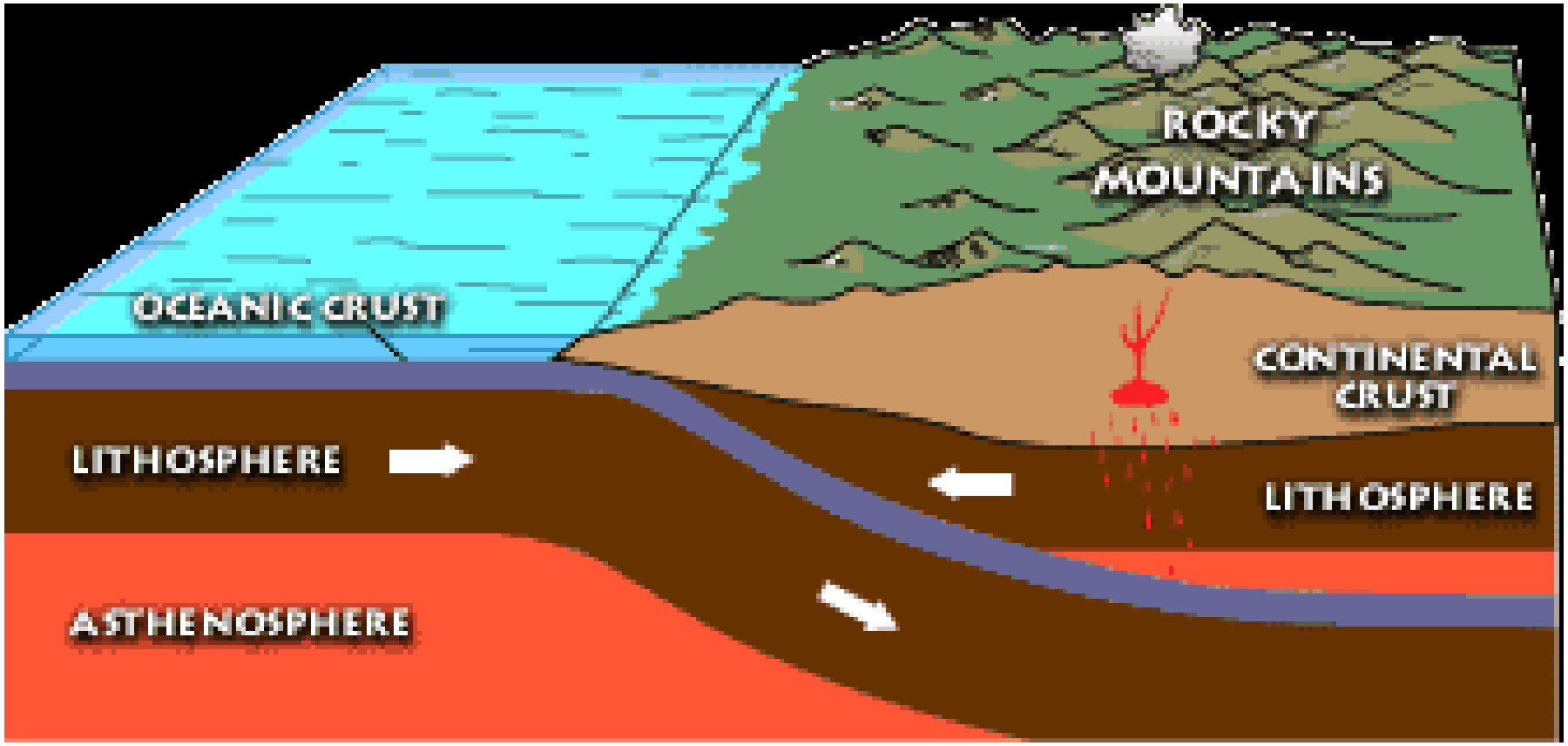

Sevier-style
deformation
(thin-skinned)
Laramide-style
deformation
(thick-skinned)
Sedimentary
rocks
Precambrian
basement

Laramide Orogeny (50- 80 Ma)

- Late Cretaceous - Early Eocene
- Deformation shifted eastward following
- Magmatism – Coast Range Arc
- Thick-skinned tectonics

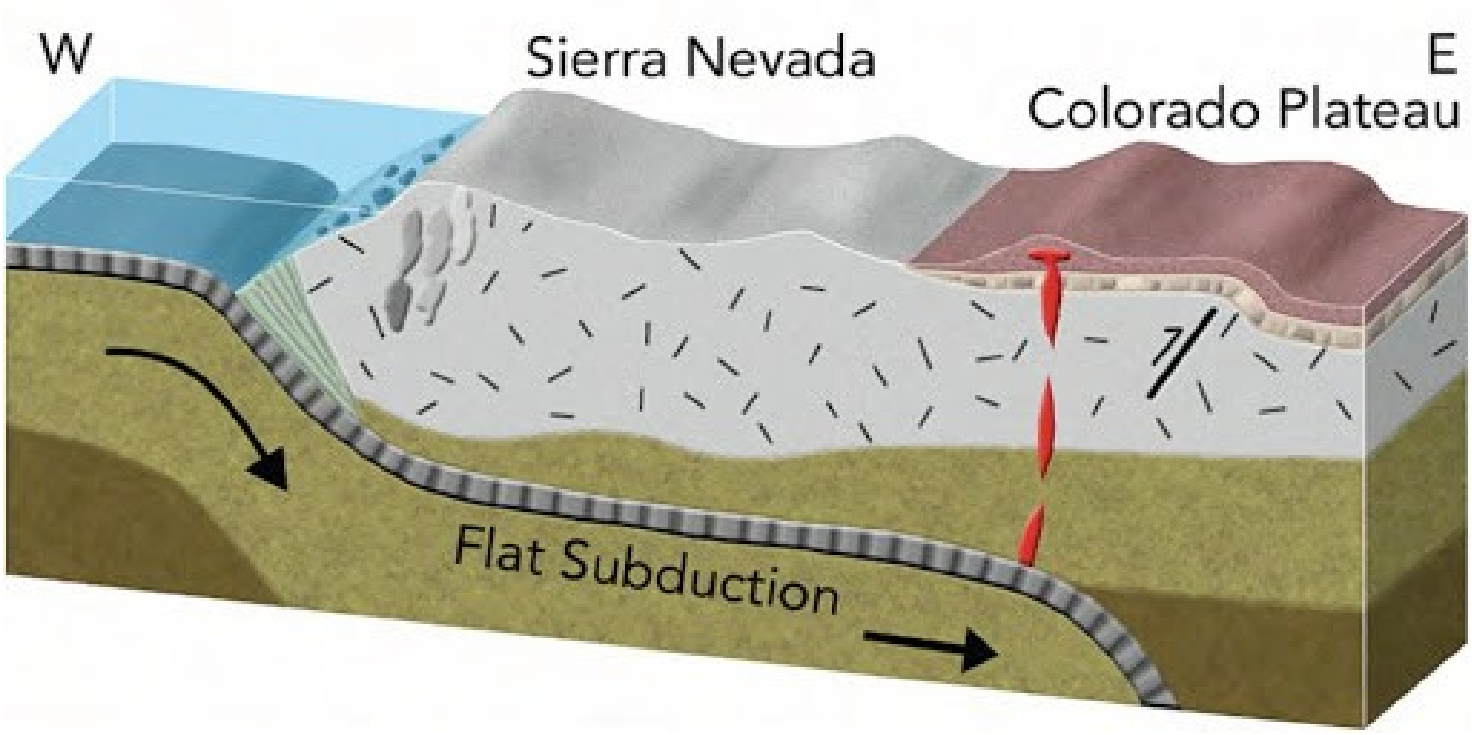
The Laramide orogeny occurred in a series of pulses, with quiescent phases intervening. The major feature that was created by this orogeny was **deep-seated, thick-skinned deformation**, with evidence of this orogeny found from Canada to northern Mexico. Most hypotheses propose that the **angle of subduction became shallow**. The Laramide Orogeny lasted about 30 million years during which the **Rocky Mountain foreland ranges were pushed up**. The area affected by the Laramide Orogeny includes the central and southern Rockies and the Colorado Plateau.

Magmatism associated with subduction occurred not near the plate edges (as in the volcanic arc of the Andes, for example), but far to the east, called the **Coast Range Arc.** Coast Range Arc is the **largest granitic outcropping** in North America, which then it is usually referred to as the **Coast Plutonic Complex** or the Coast Mountains Batholith

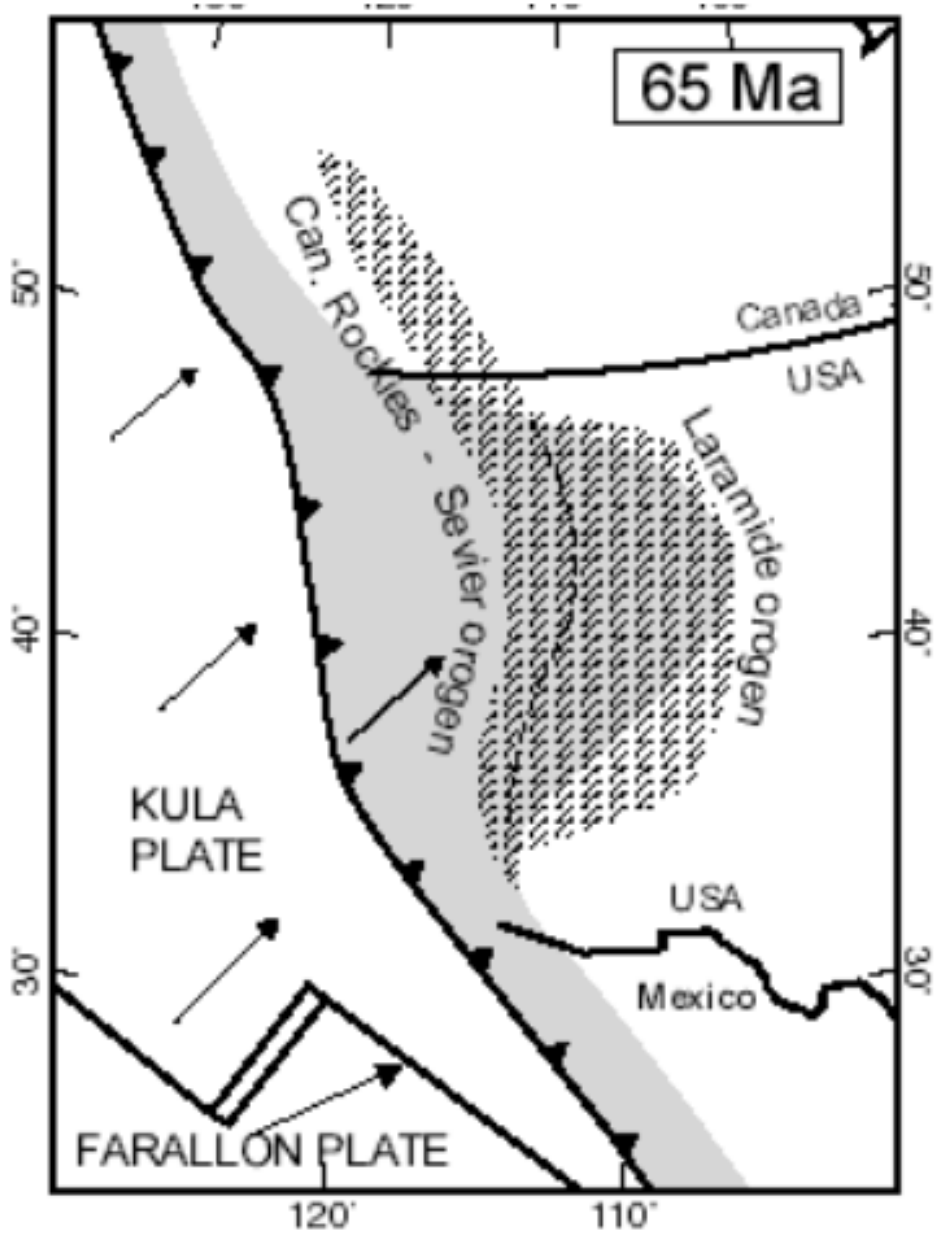


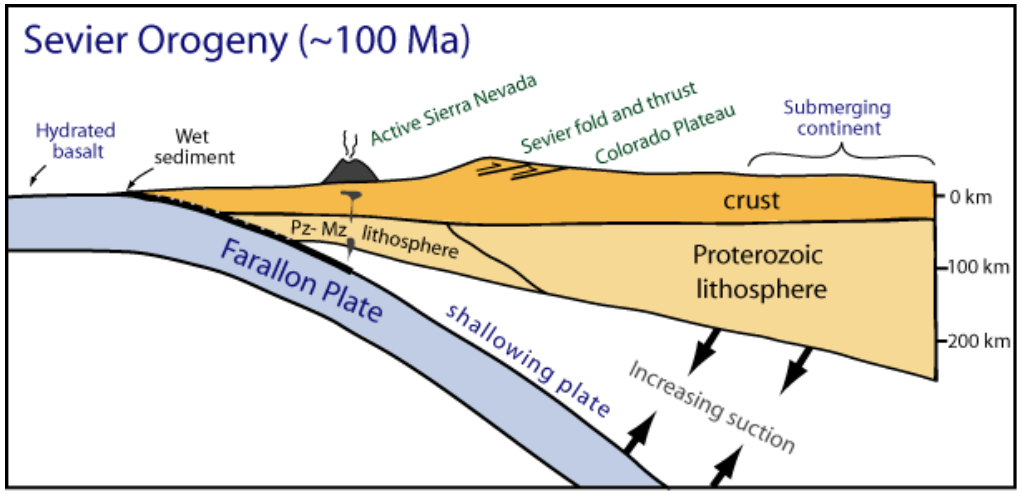
The Laramide orogeny was caused by subduction of a plate at a shallow angle. The Laramide Orogeny lasted about 30 million years during which the Rocky Mountain foreland ranges were pushed up. The area affected by the Laramide Orogeny includes the central and southern Rockies and the Colorado Plateau.

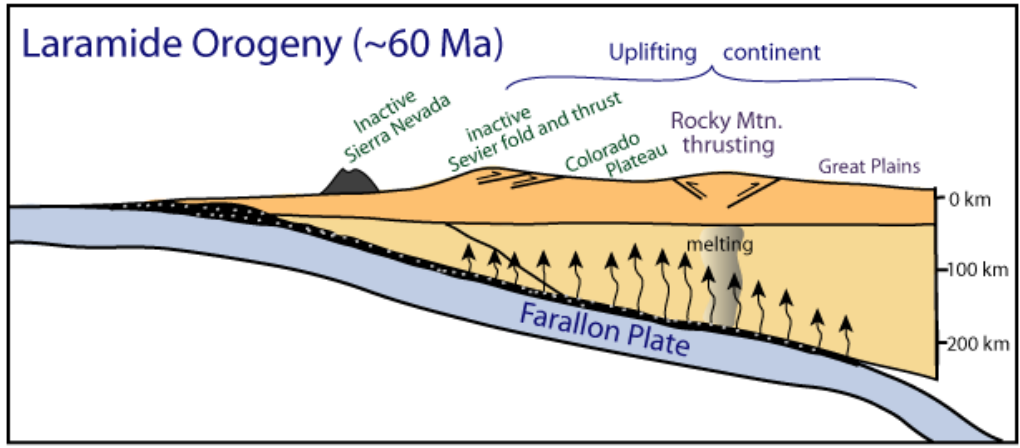
The Three Patriarchs in Zion Canyon are made of Navajo Sandstone. It may originate from the Late Triassic but is at least as young as the Early Jurassic stages Pliensbachian and Toarcian

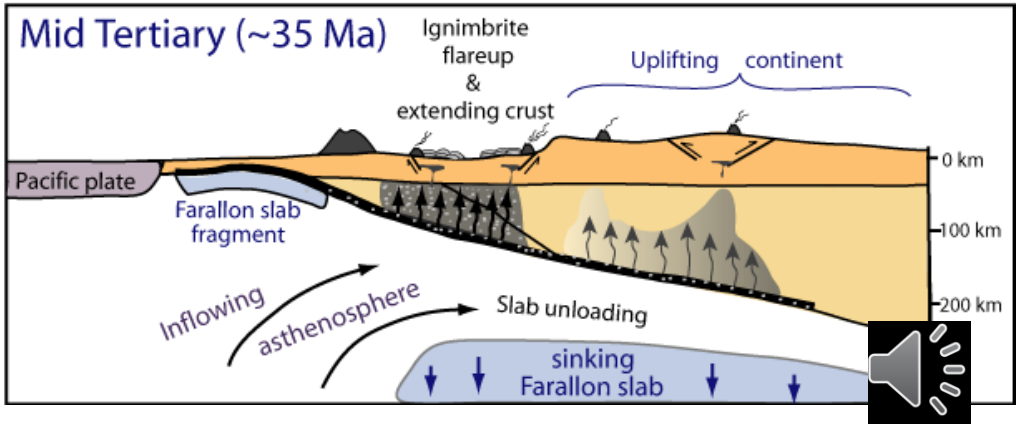


deformation landward of the relatively undeformed Colorado Plateau


65 Ma
Can. Rockies - Sevier orogen
Laramide orogen
Canada
USA
USA
Mexico
KULA
PLATE
FARALLON PLATE
50˚
40˚
30˚
120˚
110˚







Humphreys et al., 2003

Parts of the Sevier/Laramide Orogeny

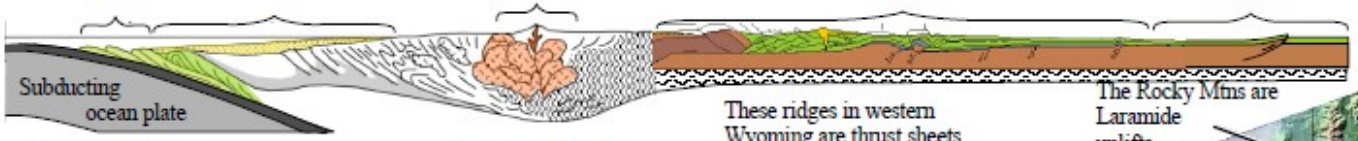
A Accretionary Prism — Sediment scraped off of subducting plate

B Forearc Basin — Sediment derived from the volcanic arc

C Volcanic Arc — Magmatic intrusion into the crust

D Fold and Thrust Belt — Thin-sheet thrusting within the sedimentary layers

E Basement-cored uplifts — Thrusting through upper crust (sediment layer is thin here)



The California Coast Ranges are largely composed of the Mesozoic accretionary prism

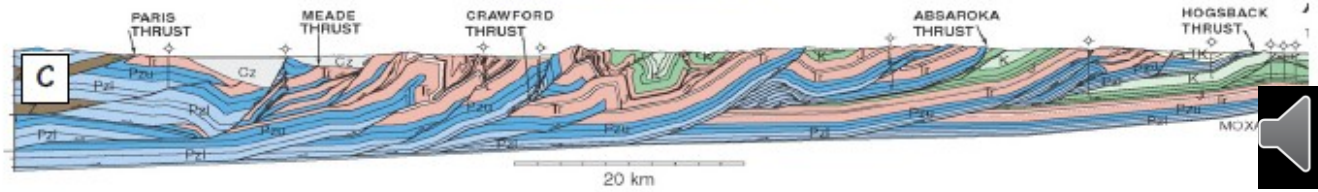
The Great Valley of California is largely composed of Sevier forearc sediments

The Sierra Nevada Mtns are the old magma chambers, of the arc, largely of Sevier age

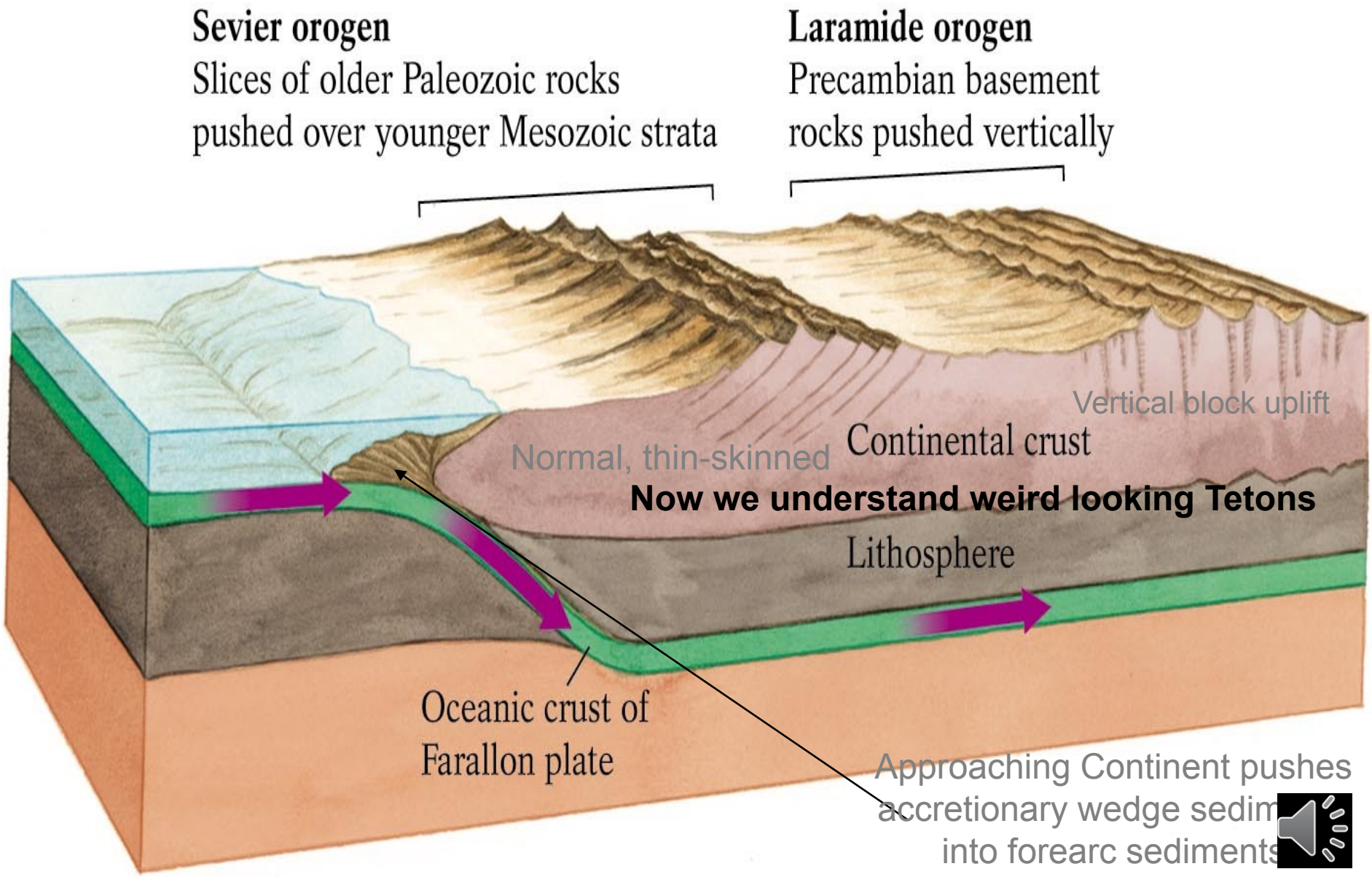
These ridges in western Wyoming are thrust sheets of Sevier age

The Rocky Mtns are Laramide uplifts

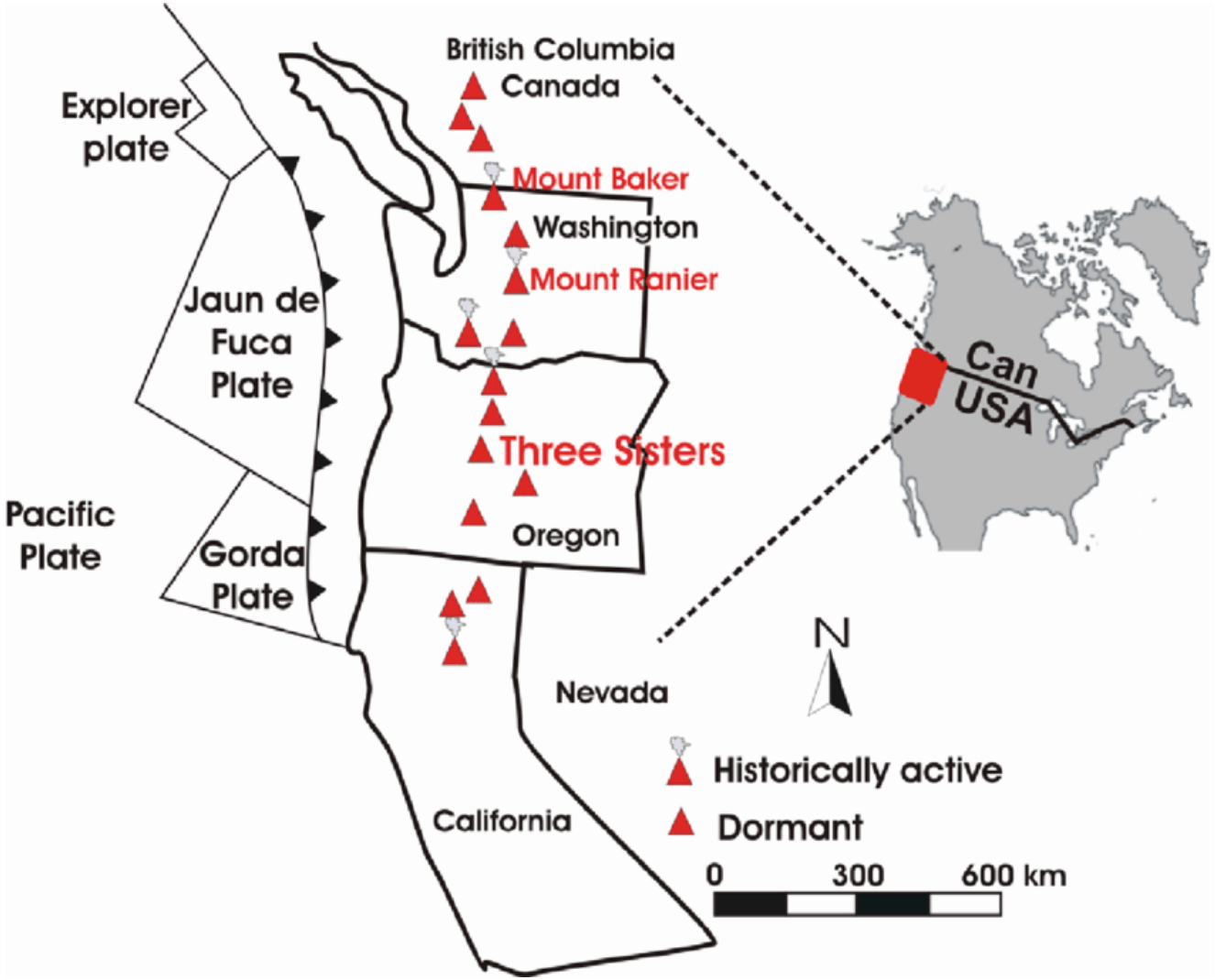
Basement-cored Laramide uplift.

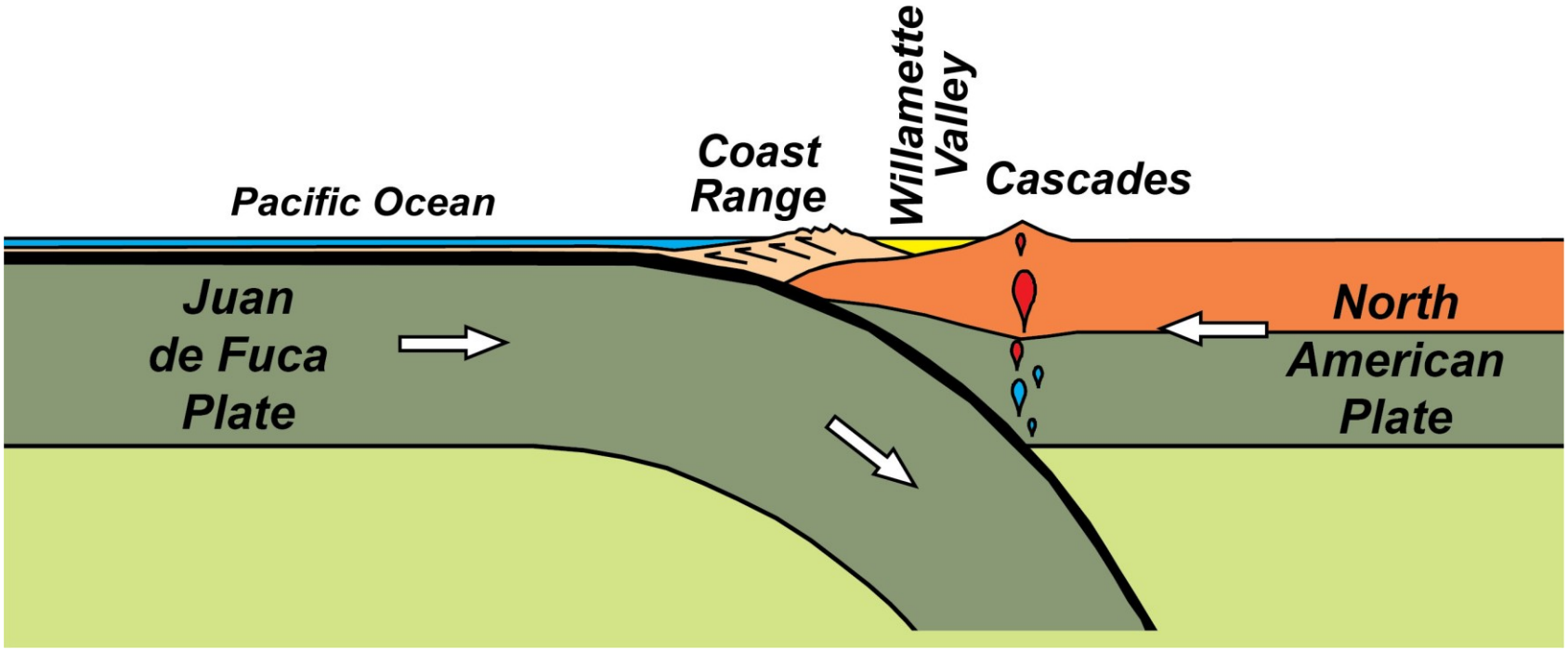


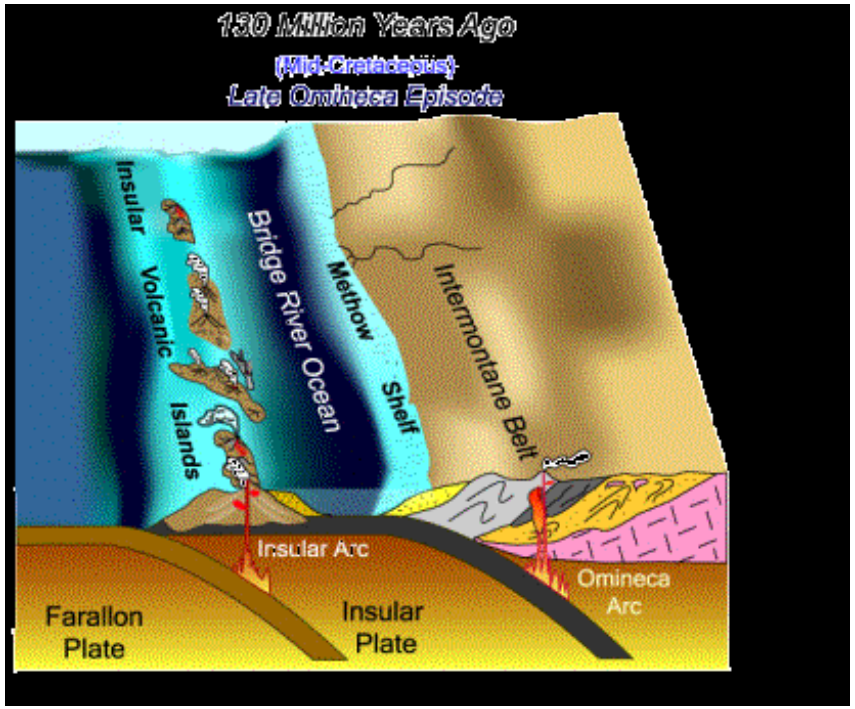
Buoyant Subduction Laramide Orogeny

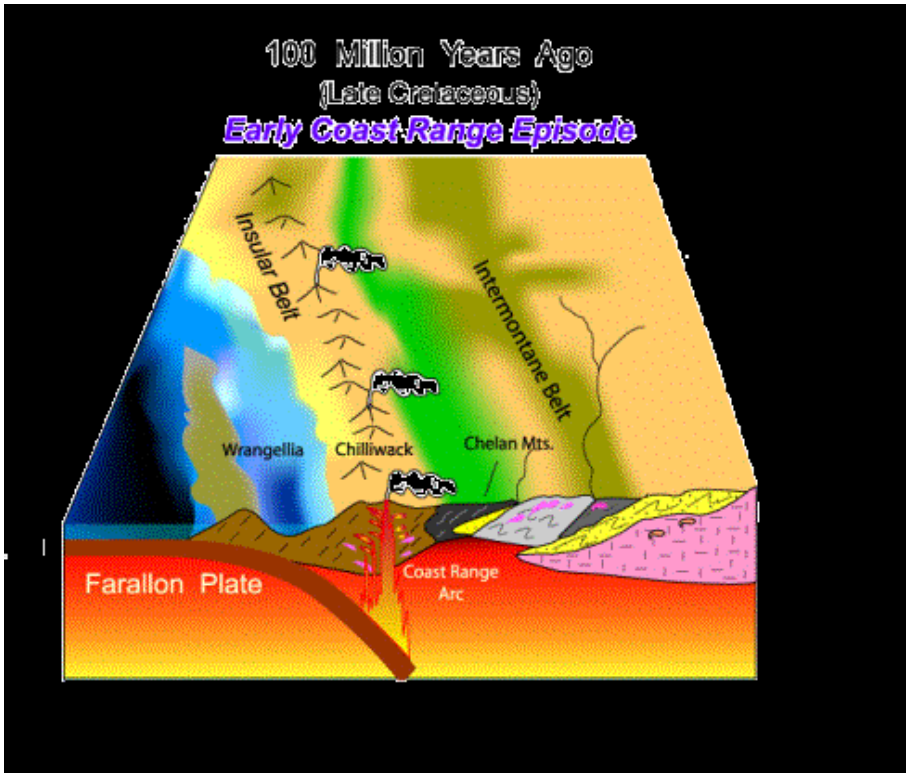


The Coast Range Arc formed as a result of subduction of the Juan de Fuca, Kula and pre-existing Farallon Plates. It is most famous for being the **largest granitic outcropping in North America**, which then it is usually referred to as the **Coast Plutonic Complex** or the Coast Mountains Batholith. Although taking its name from the Coast Mountains, this term is a geologic grouping rather than a geographic one, and the Coast Range Arc extended south into the **High Cascades of the Cascade Range**, past the Fraser River which is the northward limit of the Cascade Range proper.




Pacific Ocean
Coast Range
Willamette Valley
Cascades
Juan de Fuca Plate
North American Plate





As the Insular Volcanic Islands collided with the Pacific Northwest, the old subduction zone of the Insular Plate jammed and shut down entirely. The descending Farallon Plate took over as the active subduction zone. As molten rock from the Farallon Plate rose upward through the accreted Insular Belt, the Coast Range Arc intruded molten granitic rocks to form the Coast Range Mountains from Washington to Alaska.

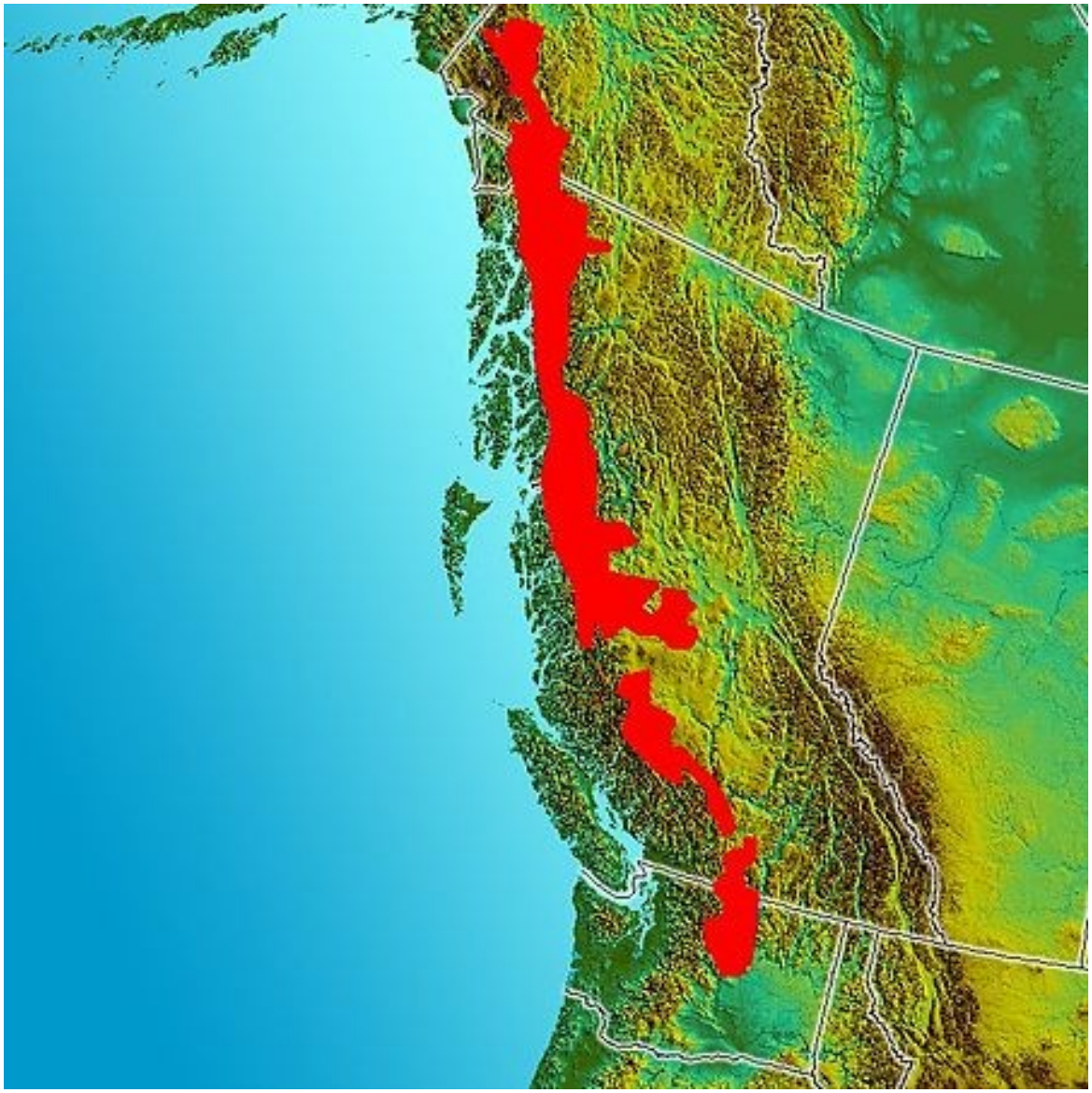
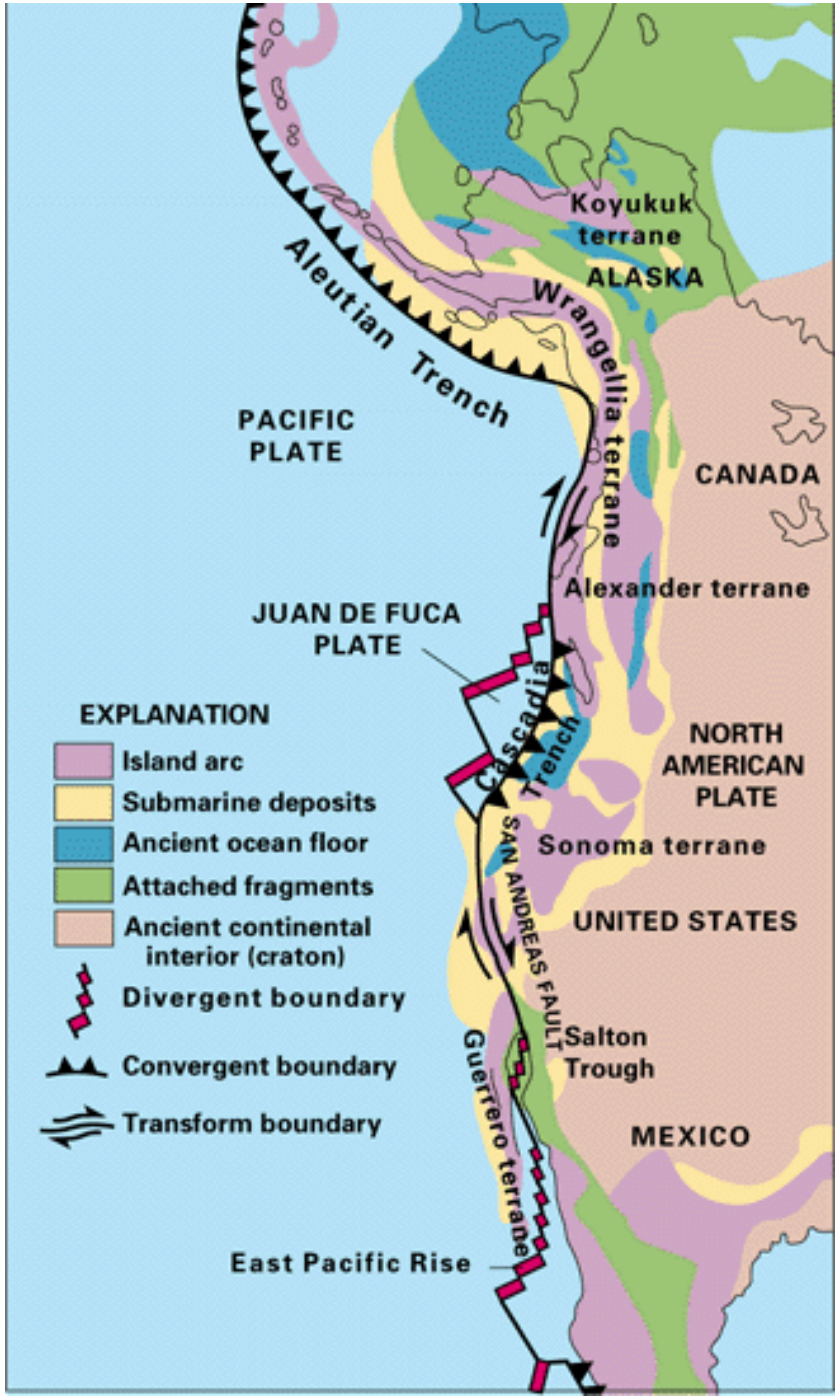


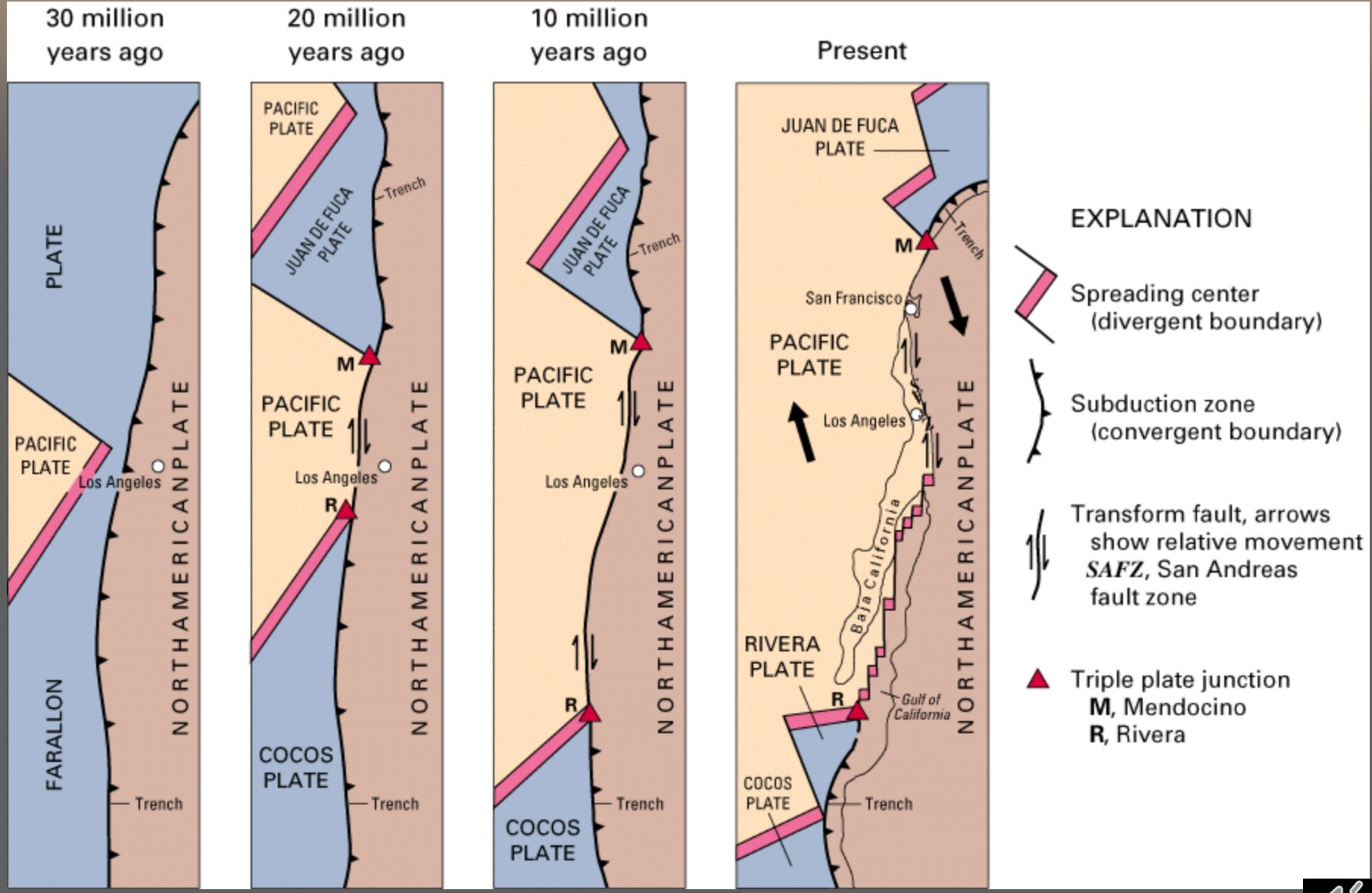
Image of the Pacific Northwest. Red indicates the inferred boundaries of the Coast Range Arc.

The Cascade Range or Cascades is a major mountain range of western North America, extending from southern British Columbia through Washington and Oregon to Northern California. It includes both non-volcanic mountains, such as the North Cascades, and the notable volcanoes known as the High Cascades. The highest peak in the range is Mount Rainier in Washington at 14,411 feet (4,392 m).

Tertiary Postlaramide evolution

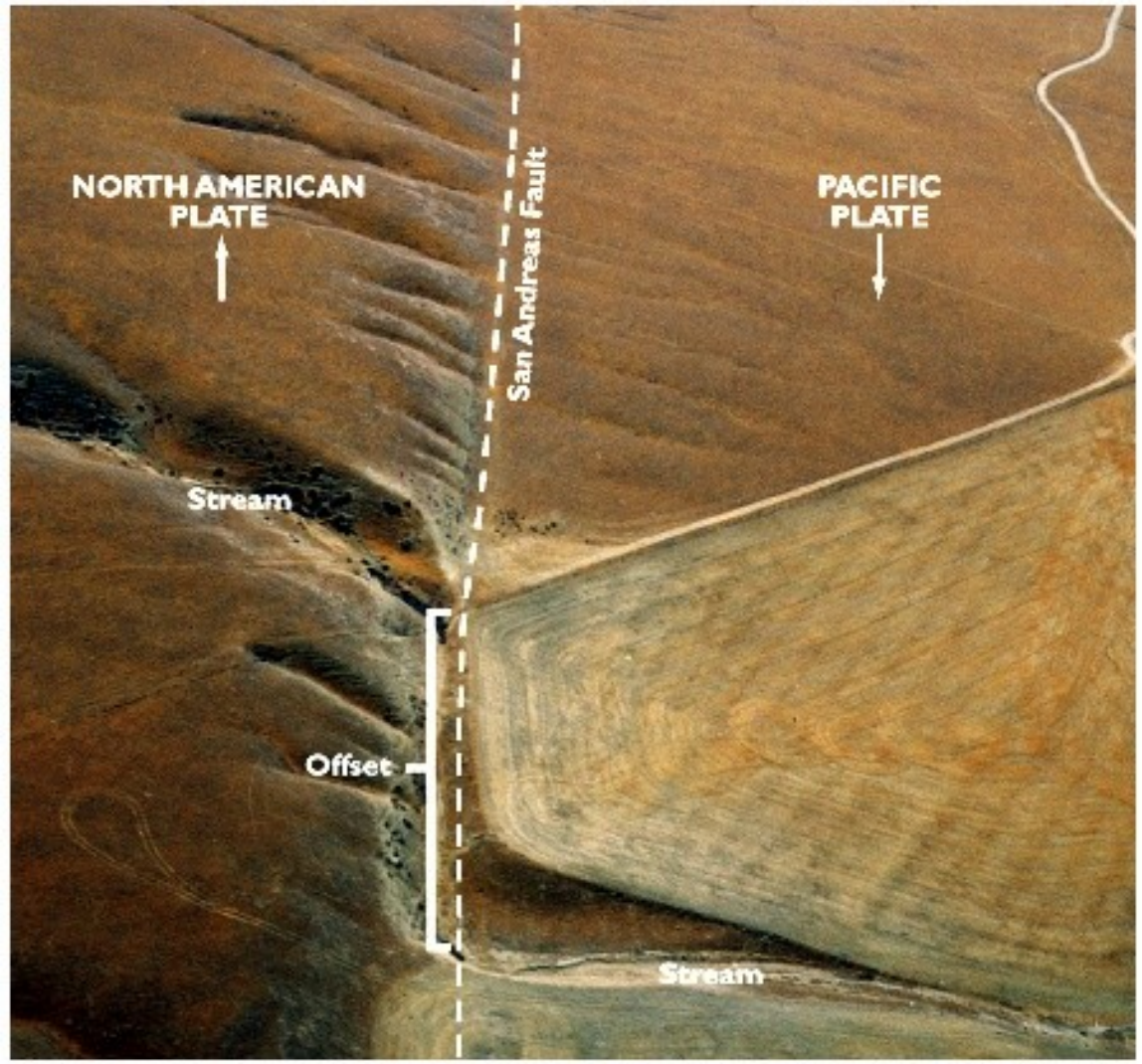
- **Faralon plate subducted**
- Tangential motion and expansion replaced convergent motion as the North American plate began **interacting with the Pacific plate**.
- The **San Andreas Fault** system was formed
- Widespread magmatism and volcanism
- **Basin and Range extension**

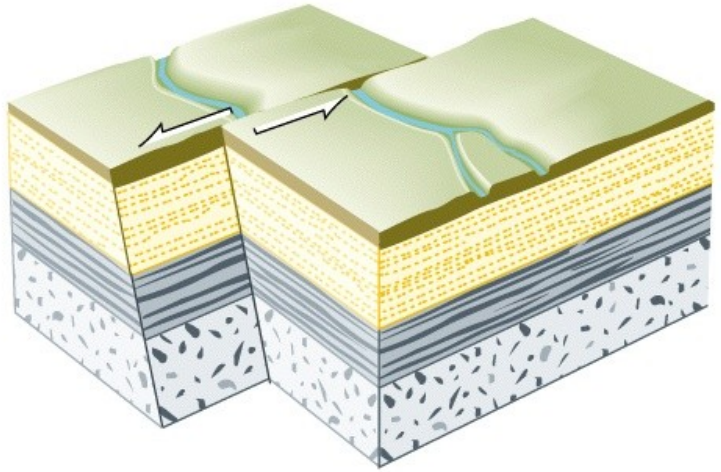

Koyukuk terrane
ALASKA
Aleutian Trench
Wrangellia terrane
PACIFIC PLATE
CANADA
Alexander terrane
JUAN DE FUCA PLATE
EXPLANATION
Island arc
Submarine deposits
Ancient ocean floor
Attached fragments
Ancient continental interior (craton)
Divergent boundary
Convergent boundary
Transform boundary
Cascadia Trench
NORTH AMERICAN PLATE
Sonoma terrane
UNITED STATES
SAN ANDREAS FAULT
Salton Trough
Guerrero terrane
MEXICO
East Pacific Rise


30 million years ago
20 million years ago
10 million years ago
Present
PLATE
PACIFIC PLATE
FARALLON
NORTHAMERICANPLATE
Los Angeles
Trench
JUAN DE FUCA PLATE
M
R
COCOS PLATE
San Francisco
RIVERA PLATE
Baja California
Gulf of California
EXPLANATION
Spreading center (divergent boundary)
Subduction zone (convergent boundary)
Transform fault, arrows show relative movement
SAFZ, San Andreas fault zone
Triple plate junction
M, Mendocino
R, Rivera

Modern California: Strike-Slip tectonics

- On the other hand, California is also a transform plate boundary zone, which is accommodated be a series of strike-slip faults.

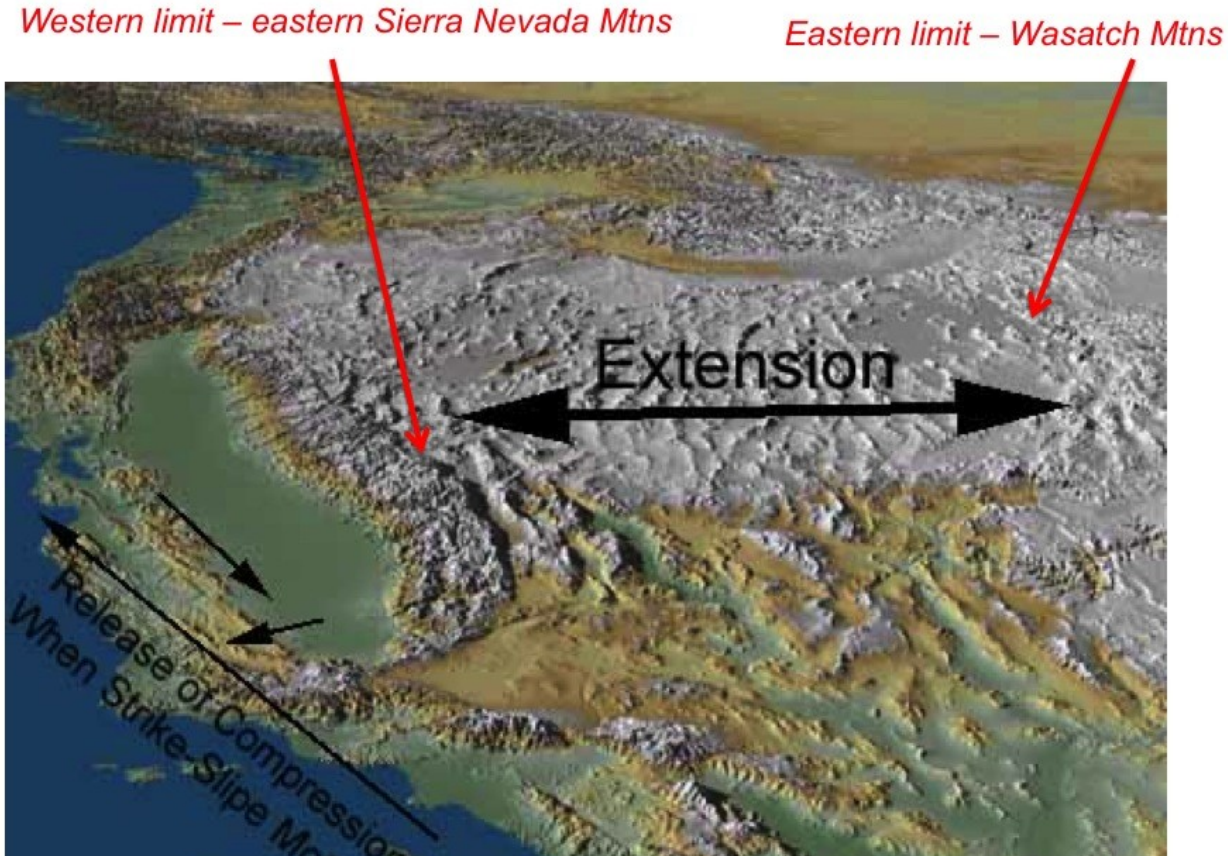




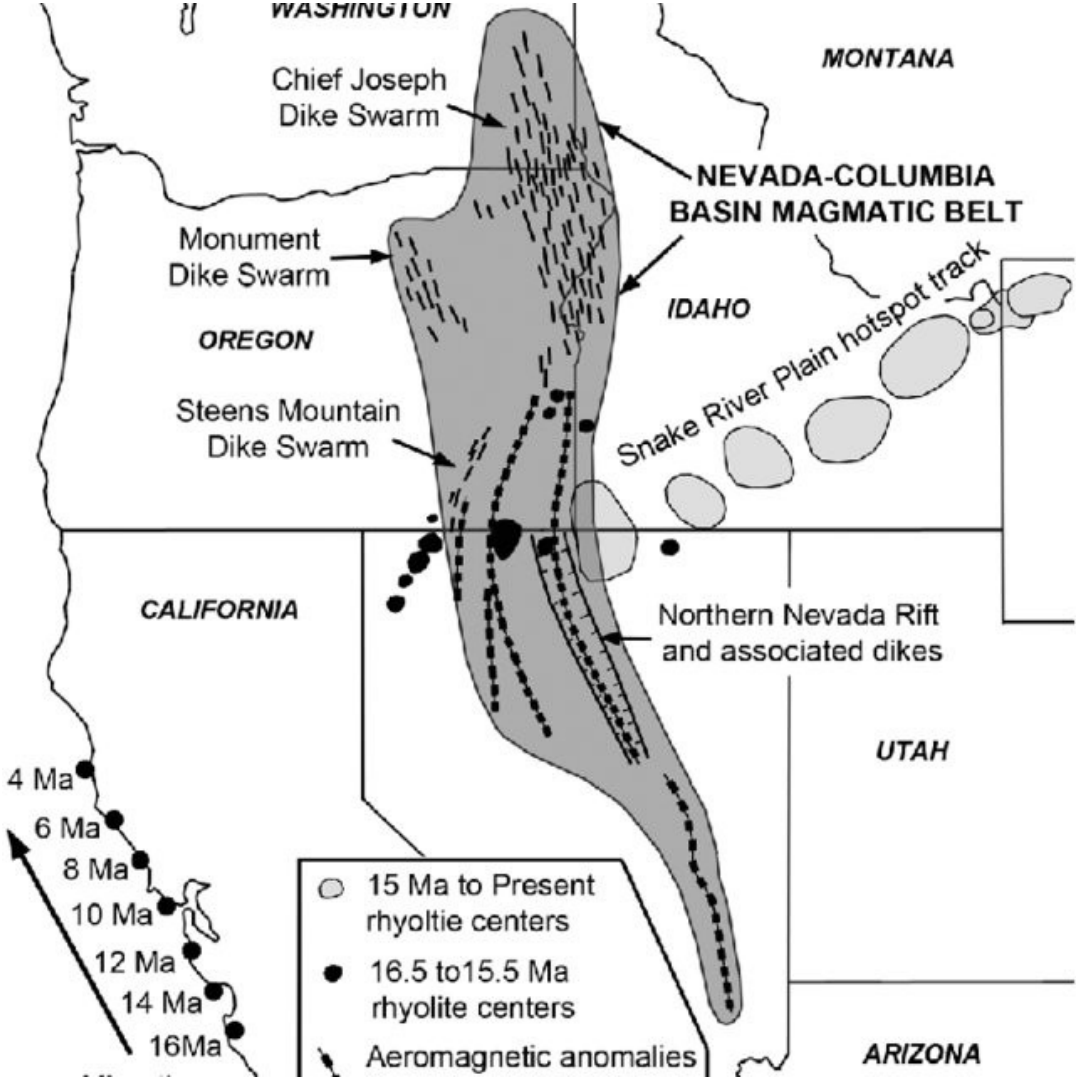
(c) STRIKE-SLIP FAULT
(left-lateral)

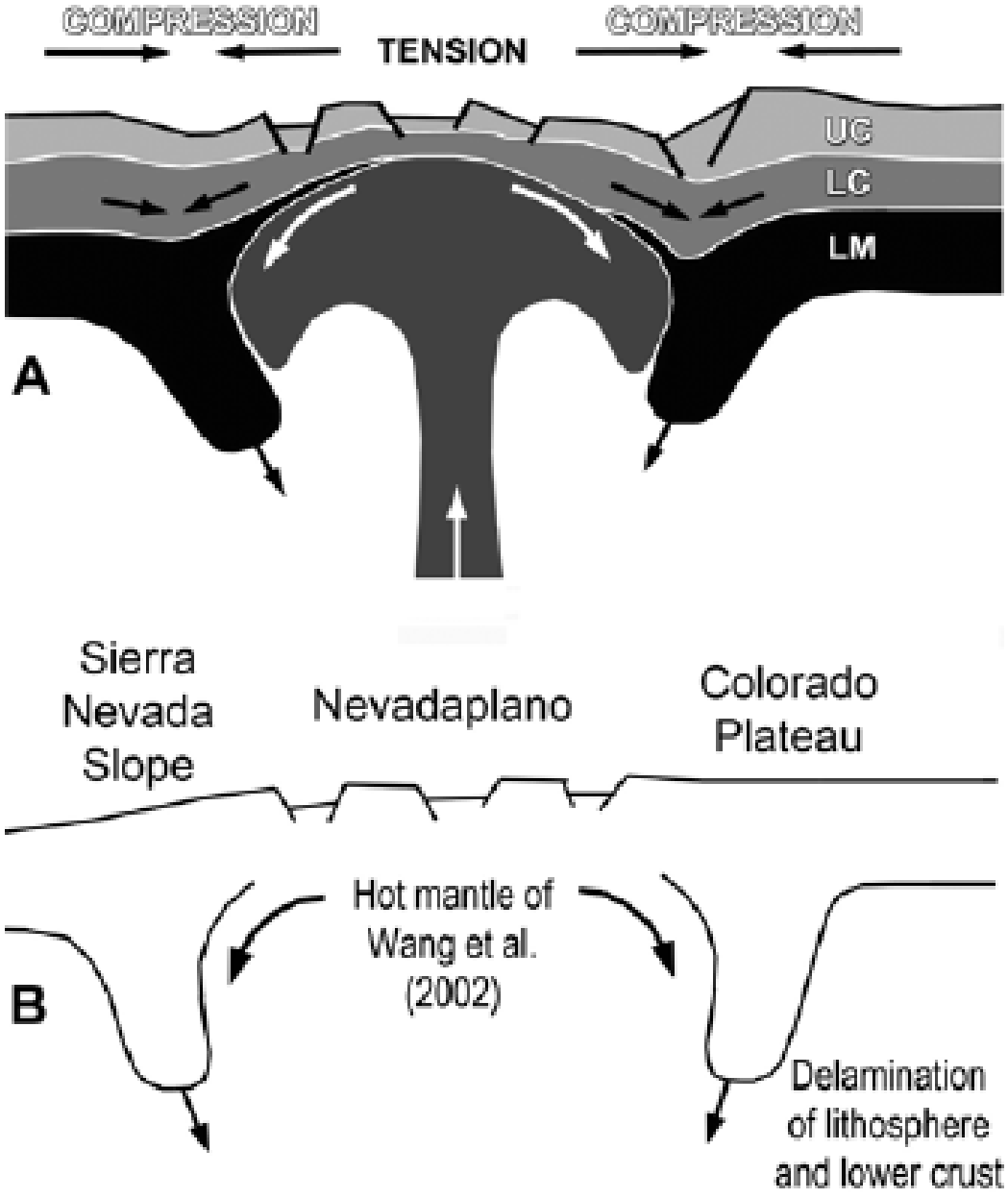
- There is evidence of strike-slip motion across the surface rupture of the 1872 Lone Pine earthquake. This air-photo of the San Andreas Fault shows a somewhat clearer offset drainage.

The Basin and Range Province is a vast physiographic region covering much of the inland Western United States and northwestern Mexico. It is defined by **unique basin and range topography**, characterized by abrupt changes in elevation, alternating between narrow faulted mountain chains and flat arid valleys or basins. The physiography of the province is the **result of tectonic extension that began around 17 million years ago** in the early Miocene epoch. This province is literally being split apart by tension connected with **magmatism along the Nevada–Columbia Basin magmatic belt** which was generated above an elongated sublithospheric melt zone associated with arrival of the **Yellowstone mantle plume-** —a region of the mantle that is hot but still solid and that is buoyantly upwelling



The **Nevada–Columbia Basin magmatic belt**, a linear zone of dikes and **basaltic** volcanic centers that extends for >1000 km, from southern Nevada to the Columbia Basin of eastern Washington.




COMPRESSION
TENSION
COMPRESSION
UC
LC
LM
A
Sierra Nevada Slope
Nevadaplano
Colorado Plateau
Hot mantle of Wang et al. (2002)
B
Delamination of lithosphere and lower crust

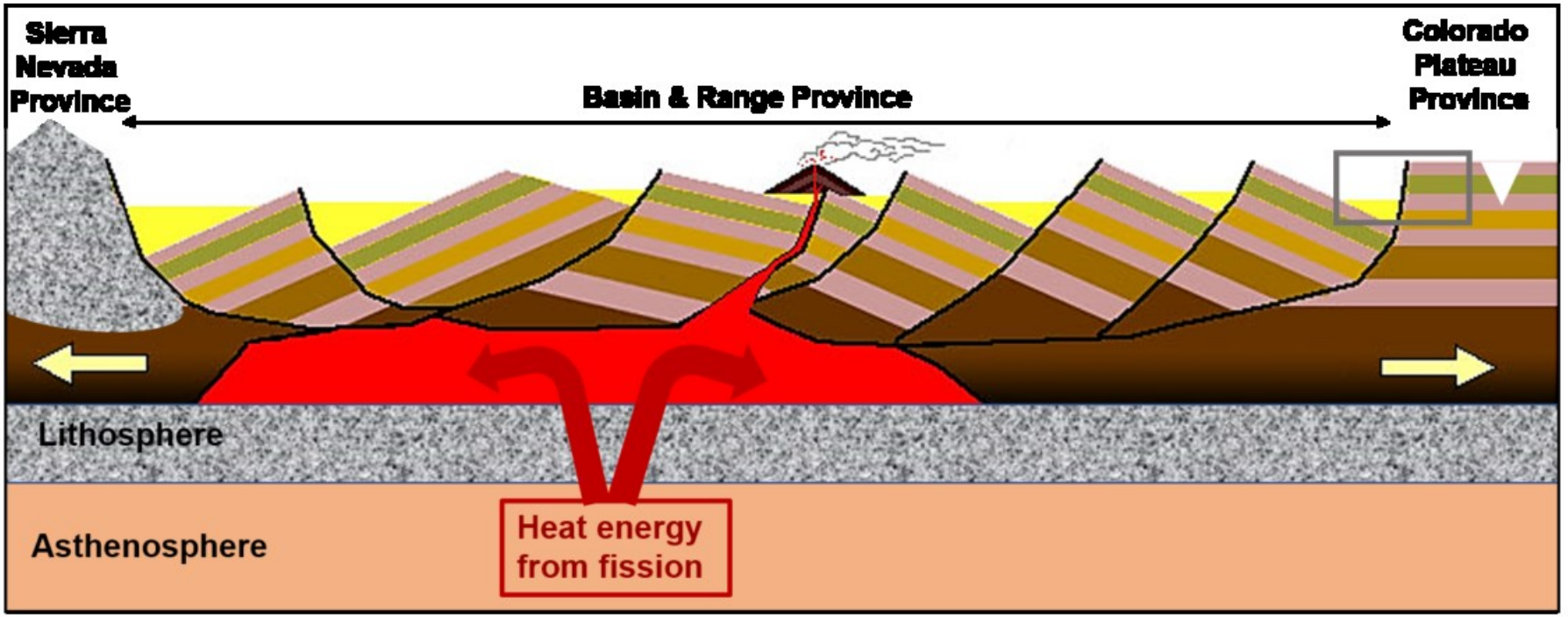


Figure 5. Cross section of the Basin and Range Province. The gray rectangular outline represents the area traversed by the Virgin River Gorge. Thin curved black lines represent faults. Modified from USGS cross section.

This province is literally being split apart by tension resulting from a source of heat energy that exists below the region. Evidence for that heat is provided by numerous volcanoes and lava flows scattered throughout this province. The term “Basin and Range” comes from the generally parallel north-trending mountains (the ranges) separated by valleys (the basins). Rocks in each of these mountain ranges are tilted and bounded by faults and are thus described as fault block mountains.


COLUMBIA PLATEAU
Yellowstone
SIERRA NEVADA MTS.
Reno
Salt Lake City
BASIN AND RANGE
COLORADO PLATEAU
Flagstaff
SIERRA MADRE OCCIDENTAL
SIERRA MADRE ORIENTAL
TRANS-MEXICAN VOLCANIC BELT

The Tetons (a range), as seen looking west across Jackson Hole, WY (a basin)

One reason the Teton Range is famous is because of the great elevation above the eastern side. Unlike most mountain ranges, the east side of the teton range lacks foothills, or lower peaks which can obscure the view. This is due to the **Teton Fault** at the base of the range on the eastern side, and the range being too young to have eroded into soft hills. The east slope of the Teton range rises sharply, from 5,000 to 7,000 feet above the valley floor.

The principal summits of the central massif, sometimes referred to as the Cathedral Group, are Grand Teton 13,775 feet (4,199 m).

Photo by C. C. Plummer

Yellowstone National Park

Grand Prismatic Spring

Old Faithful

Nachází se zde velké množství horkých pramenů, bublajících bahnitých jam, horských jezer, kaňonů, erodovaných lávových proudů a gejzírů. Nejznámějším gejzírem je Old Faithful, jenž tryská průměrně po 64,5 minutách do výšky 40 m, maximálně pak až do výšky 56 m. Takto vytryskuje asi 120 let.

Franklinsko – inuitská orogeneze

Při severním okraji severoamerického kratonu probíhala ve spodním paleozoiku ellesmerská a inuitská orogeneze.
Dostupné údaje zatím neumožňují jjeich jednoznačnou interpretaci.