

Cordilleran Orogen

Reading:

Geology of North America: An overview

G.S.A DNAG Volume A, Ch. 1 p. 1-17

Ch. 8, p. 139-232 (skim)

Main Topics

- Paleozoic Passive Margin
- Antler Orogeny (300-375 Ma)
- Sonoma Orogeny (200-280 Ma)
- Nevada Orogeny (140-150 Ma)
- Sevier Orogeny (80-130 Ma)
- Sierra Nevada Batholith
- Laramide Orogeny (50-80 Ma)
- Early Cenozoic
- Late Cenozoic

Paleozoic Passive Margin

- Existed in Late Precambrian and Early Paleozoic
- Craton and cratonic basin deposits
- Miogeocline continental shelf deposits
- An arc formed in the Ordovician

Antler Orogeny (300-375 Ma)

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

Accretionary Terranes

- Paleozoic accretion confined to Nevada
- Mainly occurred along transform faults
- Some blocks were flakes related to subduction

Wrangellia

- Docked with North America in Late Mesozoic
- Contains an Upper Paleozoic arc assemblage
 - Equatorial fauna
- Overlain by Permian cratonic sediments
- Triassic black shales, carbonates, basalts

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

Nevadan Orogeny (140-150 Ma)

- Several Upper Jurassic Arcs Collided
- Cretaceous Franciscan Fm in the accretionary prism
- Great Valley Sequence filled an elongated forearc basin
- Sierra Nevada was the root zone of the arc

Late Triassic Continental Margin Arc System

Accretionary prisms

- Klamath Mountains
- Sierra Nevada
- Volcanic detritus shed onto a large foreland basin
 - Chinle and Morrison Fms on the Colorado Plateau

Sevier Orogen (80-130 Ma)

- Fold-thrust belt behind the arc
- Eastward directed thrusts
- Prominent retro arc basins to the East
- Late Jurassic to Late Cretaceous
- Batholithic intrusions
- Great Valley Sequence
- Franciscan Formation

Laramide Orogeny (50-80 Ma)

- Late Cretaceous - Early Eocene
- Deformation shifted eastward following magmatism
- Westward directed thrusts
- Formation of major mineral belts

Post Laramide Events

- Cenozoic extension
- Basin and Range formation
- Metamorphic core complexes
- Cenozoic magmatism
- Widespread volcanism

Core Complexes

- Metamorphic-plutonic complexes
- Overlain by relatively undeformed supracrustal materials
- Detachment fault contact underlain by mylonite
- Began to rise isostatically 20 ma
- Related to crustal extension and heating

Metamorphic-plutonic complexes

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- Contact is a detachment fault underlain by mylonite
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- Related to crustal extension and heating

Tectonic Aspects

- The crust was cool enough for brittle fractures
- Disappearance of subduction along a portion of the margin
- San Andreas transform fault system near the coast
- Basin and range structures
- Represent distributed displacements to the east

Late Cenozoic

- Crustal extension
- Basin and Range formation
- Volcanism
- Lateral faulting
- Sedimentation

Basin and Range structures

- At 5-10 Ma the crust was cool enough for brittle fractures

San Andreas transform fault system

- Disappearance of subduction along a portion of the margin