

The Wacky Wonderful World of Cordilleran Tectonics

Event	Timing	Description
Transform Tectonics along California Coast	Middle Miocene - Holocene	As North American Plate overran the divergent boundary of the Farallon and Pacific plates, change in sense of motion from subduction to transform; birth of San Andreas Fault system; sealing off of southern entrance to Great Valley of California as sliver of crust containing Baja California and Los Angeles moves northward
Half-graben Rise of Sierra Nevada	Late Pliocene	Large scale tilting of old plutons (emplaced in Nevadan orogeny) in eastern California, producing modern Sierra Nevada
Basin-and-Range Extension & Volcanism	Miocene – Pliocene	Large-scale extension in American Southwest, thinning continental crust and widening region by 50-100%; associated regional volcanism
Coastal Range Orogeny	Late Miocene – Holocene	Subduction along western coastline producing Andean-style volcanoes (Coastal Ranges of California, Cascades of Northwest); continues to operate in Northwest
Flood Basalts in Northwest	Miocene – Pliocene	Columbia River Basalts (Miocene); Snake River Extrusives (Pliocene)
Uplift of Colorado Plateau	Middle Miocene	Large vertical uplift of flat region in American Southwest, with little internal disturbance; downward erosion of Colorado River produces Grand Canyon
Exhumation of the Rockies	Early Miocene – Pliocene	Uplift of ~1600 m; erosion of much of the alluvium formed in the Oligocene; downward cutting action of rivers produces “meandering” streams inside mountains
Erosion of Cordillera	Oligocene	Erosion of Laramide uplift produces alluvium which largely fills up the intramontane basins and which spreads in large wedges into the cratonic interior; meandering rivers eventually form on these wedges. The tops of the mountains are weathered down to form broad flat surfaces confluent with the alluvial wedges.
Laramide Orogeny	Latest Cretaceous – Eocene	Immense vertical uplift (up to ~18 km!) of material rather than typical orogenic belt. May have been caused by foundering Farallon Plate. Begins and ends in periods of intense volcanism.
Sevier Orogeny	late Early Cretaceous – Late Cretaceous	As mid-Atlantic ridge spreading rate increases, North American plate overruns Farallon Plate. Result is very low angle subduction and eastward migration of the igneous arc, metamorphic belts, and fold and thrust belts.
Nevadan Orogeny	Middle/Late Jurassic – Early Cretaceous	Relatively typical old-fashioned continental-ocean subduction zone orogeny (like modern Andes). Many island arcs and microplates are added along western border of North America, including all material west of Sonoma.
Sonoman Orogeny	Latest Permian – Triassic	Microcontinent of Sonoma (present day southeastern Oregon, northern California, and northern Nevada) docks onto the then-western margin of North America
Ancestral Rockies Orogeny	Pennsylvanian	Vertical uplift of blocks (Front Range and Umcompahgre) in western North America, probably result of forces from Alleghanian and Ouachitan Orogenies; massive amounts of sediments deposited in intramontane basins
Antler Orogeny	Mississippian	Antler Island arc (preserved in western Utah and eastern Nevada) docks onto then-western margin of North America