

Geologic Evolution

Oregon is the only state other than Hawaii that was not part of any continent one billion years ago. Fragments of island arcs similar to the modern Japanese islands collided with the ancestral North American continent, especially during the Mesozoic era (see Geologic Ages, p. 144). During the early part of the Cenozoic era, the last oceanic crustal block, called Siletzia, attached itself to the continent, forming the basaltic basement of what would become the Oregon and Washington Coast Range. As a result, Oregon is a volcanic state, with a greater variety of volcanic rocks than Hawaii.

Evolution Legend

Offshore

Oceanic plates

Sedimentary Deposits

Continental slope and shelf deposits

Continental alluvial basin filling

Magmatic Units

Magmatic Arc: associated with off-shore subduction
Mafic to intermediate volcanic rocks

Magmatic Belts: associated with interior extension
Andesite to rhyolite plutons and volcanic fields

Alkalic Magmatic Centers: basalt to intermediate in composition

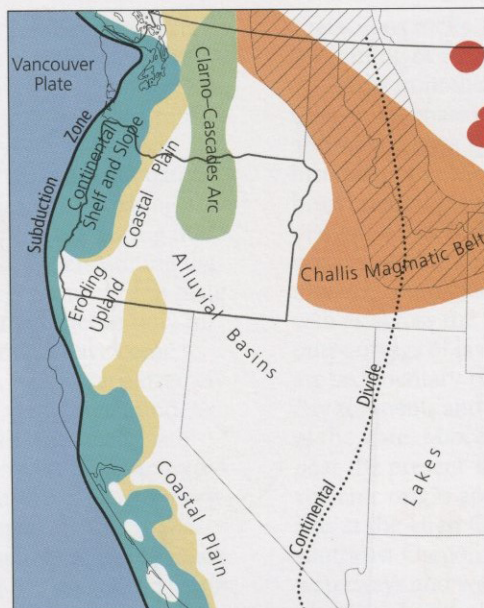
Rhyolite to trachyandesite centers

Dikes

Tectonic Zones

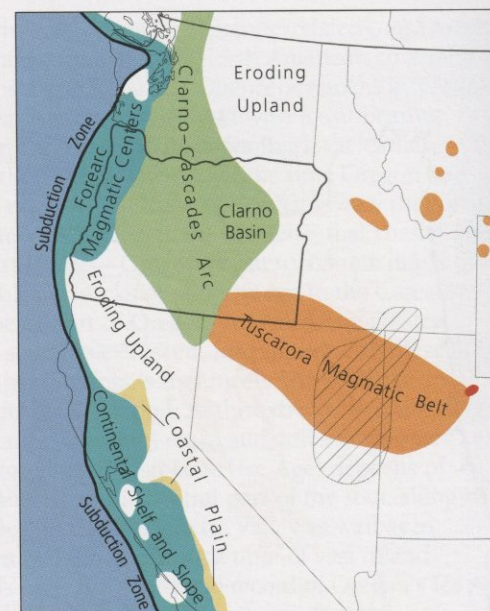
Areas of extension

Area of folding and thrusting associated with Basin and Range extension



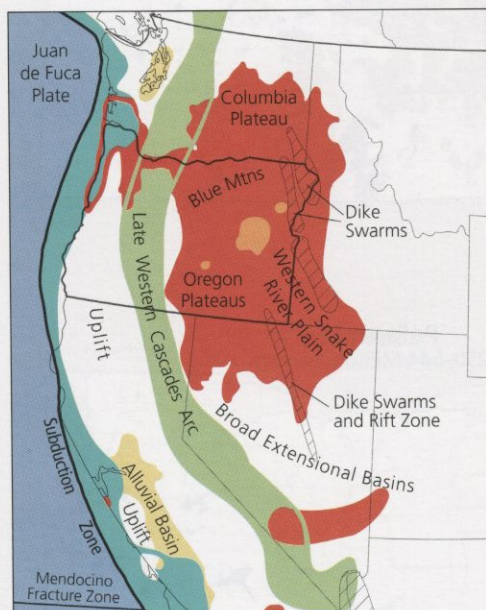
55–43 Million Years Ago

Subduction drove oceanic crust beneath Western North America. As it did, magma rose to the surface to form volcanoes, but at different locations than the present Cascade Range. The earliest of these volcanics was called the Clarno–Cascades Arc. It produced abundant volcanic rocks in Central and Eastern Oregon and as far west as the southern Willamette Valley, where volcanic rocks from this period are found today in oil-exploratory wells. West of these volcanoes, rivers deposited sediment at what was then the Oregon Coast, one segment of which extended from Eugene to Portland. Light-colored shallow-marine to non-marine sandstone of Eocene epoch forms the reservoir for the Mist Gas Field in Columbia County. Farther west, near the fault scarps of the Basin and Range, sediments of that age were deposited in deep ocean water. Near Coos Bay, these coastal and non-marine deposits resulted in commercial deposits of coal.



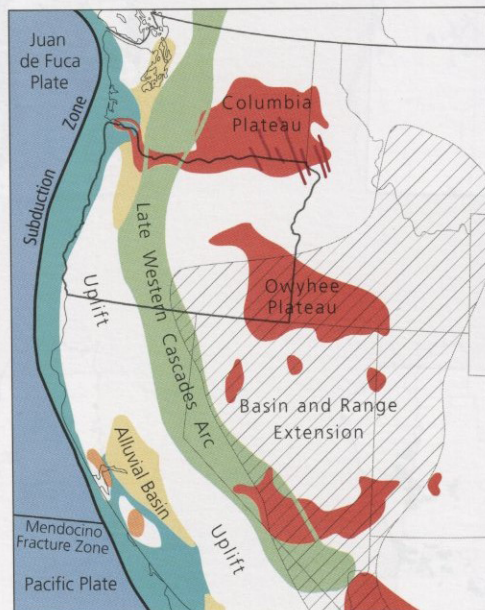
43–37 Million Years Ago

From 43 to 37 million years ago, during the late Eocene epoch, basaltic lava welled up through the older basaltic Siletzia crust, forming younger volcanic rocks in the Tillamook Highlands, Cascade Head and Yachats areas. The Clarno–Cascades Arc expanded to cover a large part of Eastern Oregon with volcanic rock.



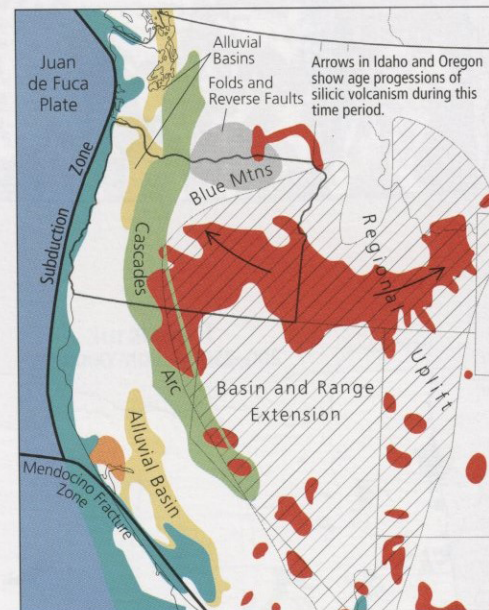
17–14 Million Years Ago

Starting about 17 million years ago, during the Miocene epoch, huge eruptions of basaltic lava called the Columbia River Basalt Group (shown in red) gushed up through fissures in northeastern Oregon and adjacent Idaho and southeastern Washington. These lavas flowed across the Columbia Plateau and between the Cascade volcanoes into the Willamette Valley as far south as Salem and across the not-yet-uplifted Coast range into the sea near Astoria. The still-unlifted Coast range today in the walls of the Columbia Gorge as well as areas in Portland and many parts of northeastern Oregon. Basalts at Cape Lookout, Cape Foulweather, Yaquina Head and Seal Rock were also part of the Columbia River Basalt Group. The greatest volume of lava came out between 17 and 14 million years ago, but smaller amounts continued to flow down the ancestral Columbia River as recently as six million years ago.



14–10 Million Years Ago

Starting about 14 million years ago, the Basin and Range of Nevada and adjacent southeastern Oregon began to spread apart, forming fault block mountains extending from Steens Mountain in southeastern Oregon westward as far as Klamath Lake. Modoc Point north of Klamath Falls is made up of one of the fault scarps of the Basin and Range. Some of these faults are still active and can produce earthquakes, such as the 1993 earthquakes near Klamath Falls. The western rim of the northern Basin and Range is the Western Cascades Arc; expansion of the crust westward is causing the Cascades and all areas west of them to move slowly westward and to rotate clockwise. The Columbia River Basalt Group continued to flow westward toward Portland but in reduced amounts, while lava flows in southeastern Oregon expanded.



10–5 Million Years Ago

Volcanic activity continued in the High Lava Plains of southeastern Oregon, where the center of volcanic activity shifted northward toward southeasternmost Oregon toward Newberry Crater southeast of Bend. The Cascades Arc continued to be active east of the older arc, though at a reduced level. Sediments from the Cascades Arc were deposited in the Willamette Lowland, which was isolated from the sea by the rising Coast Range. Deep marine sediments accumulated offshore, with the coastline similar to that of the present day. Sediments of the offshore Juan de Fuca Plate began to accrete to the North America Plate because of continued subduction.