

d26 Columbia River Plateau and Snake River Plain

< fissure flows, plateau basalts >

Plateau basalts (**Figure d26.1**) cover eastern Washington, northeastern California, Oregon, and southern Idaho.¹ The youngest of the basalt 'a'ā and pāhoehoe flows and cinder cones can be seen at Craters of the Moon NM (National Monument), Idaho.²

At the eastern end of the Snake River Plain, the oldest National Park in America, Yellowstone NP (established March 1, 1872, as a “pleasuring ground for all people”)³ is, unknown to most, a giant caldera.⁴ Its name refers to the yellow color of hydrothermally altered tuffs⁵ that crop out in the Yellowstone river valley sides.⁶

Flood basalts, also known as plateau basalts for the landform they build, typically issue from numerous fissures and flow as thin sheets. In the Columbia plateau region, flows (the thickest have been traced for 150 kilometers) interleave to build a plateau 300,000 square kilometers in area and pile to a thickness of 2500 to 4000 meters. The flows extensively submerge a preexisting rugged topography carved into granite and quartzite. Hills of these rocks that protrude through the basalts are called *steptoes* (named after Steptoe Butte in southeastern Washington).⁷ The Columbia River basalts of Pliocene age ceased extruding 3.5 million years ago. The deep gorge of the Columbia river exposes these basalt flows in section.

To the south (southern Oregon & northeastern California) and east (Snake River plain), 14 to 17 million year old flows, which fill and overflow a Miocene age rift valley, crop out extensively at the surface and are well exposed in section by the deep gorge of the Snake river.⁸ □

Figure d26.1⁹

Plateau basalt (gray) and rhyolite (light gray) areas in the northwestern United States. The Snake River Plain plateau basalts include rhyolite eruption centers that record the track (the present absolute motion of North America is shown by an arrow) of the Yellowstone Hotspot volcanism—its former locations shown by circles with numbers indicating eruption times millions of years ago (Ma).¹⁰

The Yellowstone caldera is underlain at a depth of 10 km by a magma chamber measuring some 45 km long, 20 km wide and 10 km thick. The whole is a super-volcano. Ground heavings in 1973 revealed to Robert

Smith that it is active and is readying to erupt according to its time table partly written out as three large overlapping calderas (circles) and associated rhyolite ash-flow tuffs (0.6 million year old Lava Creek Tuff of ejected-volume 1000 km³, 1.3 million year old Mesa Falls Tuff of ejected-volume 280 km³, and 2.2 million year old Huckleberry Ridge Tuff of ejected-volume 2500 km³).¹¹

