**Crater Lake 2**

1. The trend towards silica-enrichment which had started in the magma beneath Mt. Mazama over 400,000 years ago, was by 30,000 years ago reaching it’s final stage. The dangerous gas-trapping character of silica-rich magma was beginning to cause increasingly explosive eruptions that were followed by thick flows and dome formation.
2. Grouse Hill and Redcloud Cliff are comprised of thick lava flows erupted between 30,000 and 25,000 years ago respectively.
3. Other silica-rich flows which preceded and forewarned the climactic eruption of Mt. Mazama included the Cleetwood Flow and Llao Rock.
4. The violent eruption that ultimately formed Llao Rock happened about 7,900 years ago…
5. … by first blasting out an explosion crater towards the summit of Mt. Mazama similar to that created by the eruption of Mt. St. Helens in 1980.
6. A thin veneer of pyroclastics blanketed the base of the crater, over which a volcanic dome grew.
7. In a similar fashion, a white layer of pumice and ash covered the floor of a Mt. Mazama explosion crater, which soon thereafter was filled by the thick rhyodacite lava flow of Llao Rock.
8. Within 200 years of the eruption at Llao Rock, …
9. … another thick lava flow erupted near present-day Cleetwood Cove. These eruptions reached a peak 7,700 years ago …
10. … in the largest explosive eruption in the Cascades during the past 1 million years.
11. During the final stages of Mt. Mazama's existence, pressures within the mountain caused large, radial cracks to form within it. In some instances those cracks were forced open and filled with hot, molten rock that later cooled and crystallized into huge vertical slabs of resistant rock, forming what geologists call radial dikes. Devil's Backbone is one of those dikes, …
12. … standing tall and strong on the western shore of Crater Lake as the softer pumice and lava flows that once enclosed it weather away.
13. The cataclysmic eruption of Mount Mazama 7,700 years ago started from a single vent on the northeast side of the volcano as a towering column of pumice and ash that reached some 30 miles (50 km) high. Winds carried the ash across much of the Pacific Northwest and parts of southern Canada. Native Americans witnessed the event and believed it was the battle between Llao the chief of the below world who lived in Mazama’s interior, and Skell, the Chief of the Above World who lived in Mt. Shasta in northern California.
14. As more magma was erupted, cracks opened up around the summit, which began to collapse. Fountains of pumice and ash surrounded the collapsing summit, and pyroclastic flows raced down all sides of the volcano.
15. If we assume that the top of the mountain dropped into a void in the underlying magma chamber at least equal to its own volume, and that the void was created by the eruption of a large amount of magma, we can use the equation for the volume of a cone to get a rough idea as to how much magma was erupted.
16. Plugging in all the numbers gives us about 32km3.
17. … which falls nicely within the range given for Crater Lake, and puts it tied for the fifth largest eruption of the Holocene.
18. The colossal eruption blanketed a vast area with silica-rich, nutrient-poor pyroclastics. Since little grows here, the area is known as the pumice desert.
19. Some of the larger clots of magma hurled into the air were streamlined by air resistance into lava bombs.
20. The Pinnacles formed as larger pyroclasts settled on finer ash deposits and protected them from erosion. The ash here has been altered by fumarole activity.
21. When the dust had settled, the new caldera was 5miles(8km) in diameter and 1 mile (1.6km) deep. Ground water interacted with hot deposits causing explosions of steam and ash.
22. The massive eruption of Mt. Mazama removed a lot, but not all of the magma from the chamber. At this point Mt. Mazama entered a phase typical of composite volcanoes that experience large eruptions known as resurgent volcanism, where some of the remaining magma is erupted shortly after the main eruption. For Mt. Mazama this phase lasted about 750 years.
23. Since the cataclysmic eruption released most of the gas in the magma chamber, the resurgent events erupted relatively gas-depleted magma and were therefore far less violent.
24. The resurgent eruptions utilized new vents within the caldera and built the base of Wizard Island, Merriam Cone, and the central platform.
25. Although the magma composition was uniformly andesitic for each of these features, …
26. … their shapes vary because they formed at different lake levels as rain and snowmelt filled the caldera. The Central platform and base of Wizard Island have relatively flat tops because they formed from lava that erupted above the lake level and then flowed towards the surrounding shoreline where it solidified. Notice the two terraces in the base of Wizard Island. The highest and broadest of the two formed from eruptions that took place when the lake level was very near the present level while the lower terrace formed at lower lake levels. Merriam Cone and Lava dome have no such benches or terraces because they formed entirely below the water level. Sometime during, or probably after the resurgent phase of volcanism a large landslide surged across the caldera floor creating Chaski Bay in the process.
27. Resurgent volcanism and sedimentation helped seal the lake such that lake levels rose faster, eventually submerging all of the resurgent features …
28. … except for the top of Wizard Island. The last eruptions at Wizard Island took place when the lake was about 260 feet lower than today.
29. The water level continued to rise until it encountered a thick layer of porous deposits in the northeast caldera wall. These deposits stabilize lake levels like an overflow drain in a bathtub.
30. Due to several unique factors, most prominently that it has no inlets or tributaries, the waters of Crater Lake are some of the purest in North America. The deep blue color for which the lake is famous comes from the fact that water molecules scatter mostly blue light and there are virtually no other particles in the lake to scatter other colors.