Geology of the Proffit Mountain Scour

Proffit Mountain is a highly eroded remnant of the western edge of a large volcanic caldera, produced by a large stratovolcano 1.5 billion years old. This volcano and other volcanoes in the region were fueled by a large magma chamber created by the nearby subduction of oceanic crust under the continent and the accretion of island arcs to the southwest edge of the continent. These ancient island arcs and the resulting igneous rocks from the eruptions now form Southern Missouri. On December 14, 2005, the reservoir at the top of the mountain broke. 1.3 billion gallons of water obliterated a 700 foot wide section of the hillside forest in about 12 minutes, revealing the underlying geology.

**Dolomite** - This dirty white colored rock is found at the edges of the lower valley and was deposited around 500 million years ago as an ocean covered the region as carbonate sediment from the shells of microorganisms collected and hardened on top of older igneous rocks. This rock is easily eroded by groundwater, which forms Missouri's famous caves, springs, and infamous sinkholes. It is important not to mistake dolomite with the flood sediments that covers much of the lower valley, which were washed down from rock formations above.

**Conglomerate** – This orange, red, and brown sedimentary rock is a combination of sandstone and dolomite that bind large chunks of older igneous rocks. These rocks are some of Missouri’s oldest sedimentary rocks, deposited 520 million years ago. Alternating layers in the rock indicate the possible presence of an ancient shore of a beach or river basin.

**Granite** – This granite is a red and gray rock and represents a part of the hardened remains of the ancient magma chamber. The granite is high in silica containing large mineral crystals of quartz and feldspar, which corresponds to viscous magma and some of the most explosive eruptions on Earth.

**Saprolite** – Saprolite is a chemically eroded rock, and here it is found as a thin layer between the granite and rhyolite, with a larger section on the east side. The scour contains rhyolite saprolite, which is a soft, weathered, purple rock, and diabase saprolite, which is a dark orange, rounded cube rock. The diabase saprolite represents a more recent intrusion of silica poor magma between the rhyolite and the granite, although most of the diabase has eroded away long ago, leaving just saprolite in its place.

**Rhyolite** – This is a purplish brown rock at the top of the scour. Rhyolite has the same chemical composition as granite, but it is fine grained as it represents cooled lava that hardened rapidly, giving no time for the large mineral crystals to form that are visible in granite.

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