

BIG SOUTHERN AND EAST BUTTES, RHYOLITIC DOMES ON THE SNAKE RIVER PLAIN IN IDAHO. Dallas B. Spear and John S. King, State University of New York at Buffalo, Amherst, New York 14226

Three buttes form prominent landmarks on the Snake River Plain between Arco and the Idaho Falls-Blackfoot area in Idaho. Big Southern Butte, the largest of the three, has a diameter of 8 km and rises some 760 m above the Plain. Middle Butte, located 19 km east northeast of Big Southern, is 1.6 km in diameter and 335 m high. Three km east of Middle Butte is East Butte which is 2.4 km in diameter and stands 300 m above the surrounding lava flows. Two of the buttes, Big Southern and East, are rhyolitic in composition whereas Middle Butte is composed of stratified basalt.

The origin of these buttes has long been controversial. Russell (1902) believed them to be steeples or kipukas, ancient rhyolitic volcanoes surrounded by basalt. Stearns and others (1938) felt they were fault blocks of older rock which had been uplifted and eroded. Recently, it has been suggested that the rhyolitic buttes represent relatively young rocks emplaced as viscous plugs and domes from a remobilized rhyolitic basement.

Preliminary mapping has shown that Big Southern Butte consists of two coalescing cumulo-domes, each of which may have had more than one intrusive center. The division into two primary domes is based on overall morphology and characteristic differences in rock types. The domes are aligned along a west northwest trend with the older dome the more easterly.

The older dome is characterized by a laminated lavender rhyolite which grades in the upper parts of the section to a "sugary" white rhyolite, probably due to hydrothermal alteration. Attitudes of the flow banding generally document flow outward from the center on all sides. Numerous and varied breccias are found on the slopes, most of which are believed to be crumble breccias formed as the dome expanded and grew. Some of the breccias at one outcrop are associated with two thin (5-10 cm thick) ash layers and are thought to have resulted from volcanic eruptions from a vent. This suggests that Big Southern Butte did not grow exclusively by internal expansion. In addition to the breccias, obsidian and minor pumice are present as mappable units.

The younger dome of Big Southern Butte consists of white rhyolite which is very homogeneous and shows but minor flow banding and few associated breccias. Some of the upper part of the rhyolite is hydrothermally altered with intricate caverns and patterns formed by solution and wind action. A few basaltic fragments were found in the rhyolite at one locality.

A north-northwest trending fault separates the white rhyolite of Big Southern Butte from an estimated 230 m section of basalt which dips about 40° in a northeast direction. The bottom of the basalt section is extremely altered but grades into unaltered basalt toward the top.

East Butte has a simpler history than Big Southern. It appears to be a single cumulo-dome made up primarily of a laminated rhyolite with large phenocrysts of sanidine. Also there are numerous inclusions of basalt fragments, presumably torn from the sides of the conduit during the rise of the silicic magma to the surface. Flow banding at East Butte is away from the center in all directions.