Capulin Volcano

Location: 36 degrees 47 minutes N latitude, 103 degrees 59 minutes W longitude

Type: Basaltic scoria cone

Age: 56,000 to 62,000 years

Significance: Large and symmetric example of a basaltic scoria cone; first National Monument; and paved road to summit crater.

General Discussion about the Volcano

Capulin Volcano is one of the youngest volcanoes in the Raton-Clayton volcanic field and a classic and symmetrical, example of what volcanologists refer to as a "cinder cone," or "scoria cone." It is unusual for several reasons. It is big. It is nearly a mile across at its base, has a relief of nearly 1,000 feet, and a summit crater more than 300 feet deep, making it one of the larger examples of this type of volcano. Par'cutin volcano in Mexico (the one that erupted in 1943 in a Mexican farmer's corn field) and Sunset Crater in Arizona (near Flagstaff) are two other young cinder cones of similar size. Capulin Volcano is one of the few volcanoes whose summit can be reached on a paved road in a private vehicle. It is the only volcano on the continent with a parking lot on the crater rim, so anyone may visit the crater.

Recent work by geologists from College of Santa Fe, Northern Arizona University, and NM Tech in conjunction with the Park Service (Sayre et al, 1995; Stroud, 1996), has resulted in new geologic mapping and age dates. This new work indicates that Capulin Mountain erupted approximately 56,000 to 62,000 years ago, a somewhat older age than the reported age based on correlation with the famed Folsom paleosite (~11,000 years ago). Capulin Mountain is a classic cinder cone with associated small volumes of lava flows and is similar in size, morphology, and probably eruptive characteristics to Par'cutin volcano, Mexico.

A complicated series of lava flows and cinder/spatter eruptions occurred, during or after eruption of the cinder cone, in order to build Capulin Volcano. Three major series of lava flow units occurred, the earliest flowed to the east-southeast of the cone, the second to the

these eruptions several intermittent lava lakes formed at the lower flanks of the volcano and portions of the cone were "rafted" away on the surface of the flows.

In map plan view, the base of the cone is somewhat elongated. Morphometric analysis of the cone, its summit crater shape, and the distribution of late ash on the cone flanks suggests that the vent moved laterally to the west late in the construction, possibly as a result of slumping on that side during emplacement of the late lava flow unit (see model section below).

Some Views of Capulin Volcano Model section through Capulin Volcano Below is a model section through Capulin Volcano. The view is essentially opposite in direction from the view above. At the foot of the volcano in the background, the Monument headquarters appear as a small cluster of buildings. The internal structure of Capulin is probably similar to many scoria cones, and consists of inward and outward-dipping ash, cinder, and scoria layers. At some point in the history of the Capulin eruptions, possible as a result of the boca formation on the west flank, the vent shifted to the west. As a result, ash and cinders were deposited inside the east rim of the former crater. The final crater as it exists today is slightly offset from the position the crater occupied during most of the cone's emplacement.

More about Cinder (Scoria) Cones

Expanded Discussion about the Raton-Clayton field

Photo Album of Scenes from the field

General Reference Information

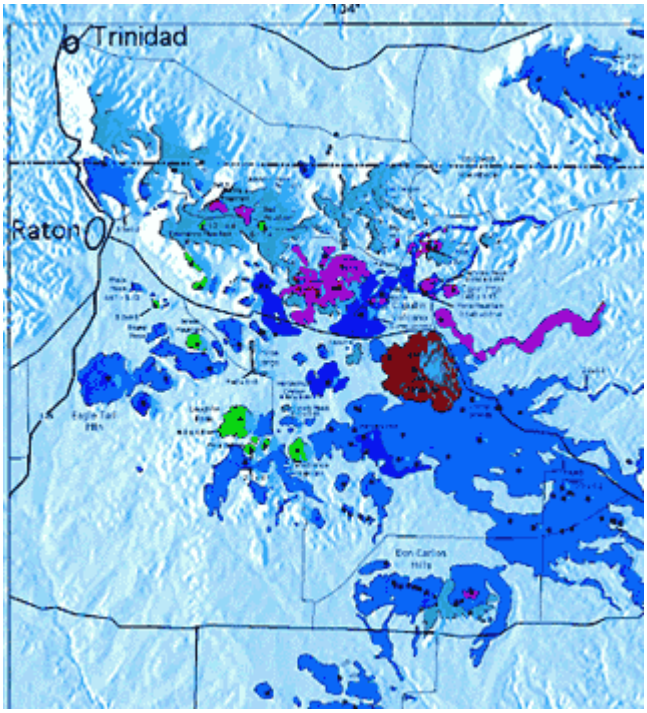
Raton-Clayton (Capulin Volcano) Volcanic Field

Location: 36 to 37.3 degrees N latitude, 103.1 to 104.3 degrees W longitude

Type: Extensive volcanic field of scoria cones, silicic volcanoes, and lava flows

Age: 9 million years to 40,000 years

Significance: Large and young monogenetic scoria cones; extreme diversity of lava compositions from very mafic to dacitic.



General Discussion about the Volcanic Field

The Raton-Clayton field is one of the best examples of a large volcanic field in the world. Volcanic fields differ from the more popular conception of volcanoes, like Hawaii or Mount St. Helens. Instead of one big volcano, volcanic fields are clusters of many small volcanoes (up to 2 miles across). Volcanic fields are usually 60 or more miles across, and contain tens to several hundred separate volcanoes. Each volcano consists mainly of cinders, spatters, and dark lava flows. The volcanoes do not all form at the same time. Instead, several thousand years may pass between the eruption and formation of each volcano. Volcanic fields represent many eruptions spaced out over a period of several million years.

The Raton-Clayton volcanic field (RCVF) is the eastern-most Cenozoic volcanic field in the United States. To the east, Cenozoic volcanic rocks are not encountered at this latitude again until the mid-Atlantic ridge. [As an interesting note and insight into the absence of appreciation of local geologic features common in most areas of the world: The town of

young, and largest volcanic fields in the North American contnent!

The volcanic field covers nearly 7500 square miles of northeastern New Mexico and adjoining Colorado and Oklahoma. The distinctive characteristic of the Raton-Clayton field is its great size, young age, continental interior setting, and possible association with one of the few volcanic hot spots in the world. If you start traveling east, you would not encounter volcanic rocks this young again until the mid-Atlantic ridge. The lava compositions are also somewhat unusual. And it is the site of Capulin Volcano, the eastern-most young and easily accessible volcano in North America.

The Raton-Clayton volcanic field is best known to historians as the site of some of the best preserved segments of the Santa Fe trail. Famous landmarks on the trail such as Round Mound, Wagon Mound, and Rabbit Ears Mountains are all volcanic centers. The field is of note because it lies at the northeastern end of the "Jemez lineament", a prominent alignment of volcanic fields extending from the Pinacate field of Mexico, through the Springerville field on the southern margin of the Colorado Plateau in eastern Arizona; the Zuni-Bandera field and the Mount Taylor fields near Grants, western New Mexico; the Jemez field and Cerros del Rio Fields near Santa Fe; and terminating in the northeastern corner of New Mexico in the Raton-Clayton field. Because the alignment of fields in the Jemez lineament is parallel to the Snake River-Yellowstone volcanic hot spot track, the Jemez Lineament has been considered by some volcanologists to be a type of volcanic "hot spot". Hot spots are rare, unlike the very common and explosive type of volcanoes like Mount St. Helens. Only 49 volcanic "hot spots" are recognized by volcanologists in the world. A few other famous volcanic hot spots include the Azores, Reunion Island, Iceland, Hawaii, and parts of East Africa.

The oldest rocks range from about 9 million years old, and the youngest erupted as little as 45,000 years ago. The earliest lavas of the Raton-Clayton field flowed onto the surface of sediment shed eastward from the Sangre de Cristo Mountains. Continuing uplift during eruption resulted in the erosion of this surface where it was not capped by volcanic rocks. During subsequent eruptions, lava flowed down valleys cut between the lava caps. The result is a series of "inverted topographic valleys" such that the oldest volcanic rocks are now found at the highest elevations above present erosional levels, with younger lavas at progressively lower levels. The most recent volcanic activity occured at several volcanoes in the center of the field in the vicinity of Capulin Mountain, where lava flows have moved down current drainages.

Discussion of Capulin Volcano and Scoria Cones

Expanded Discussion about the Raton-Clayton field

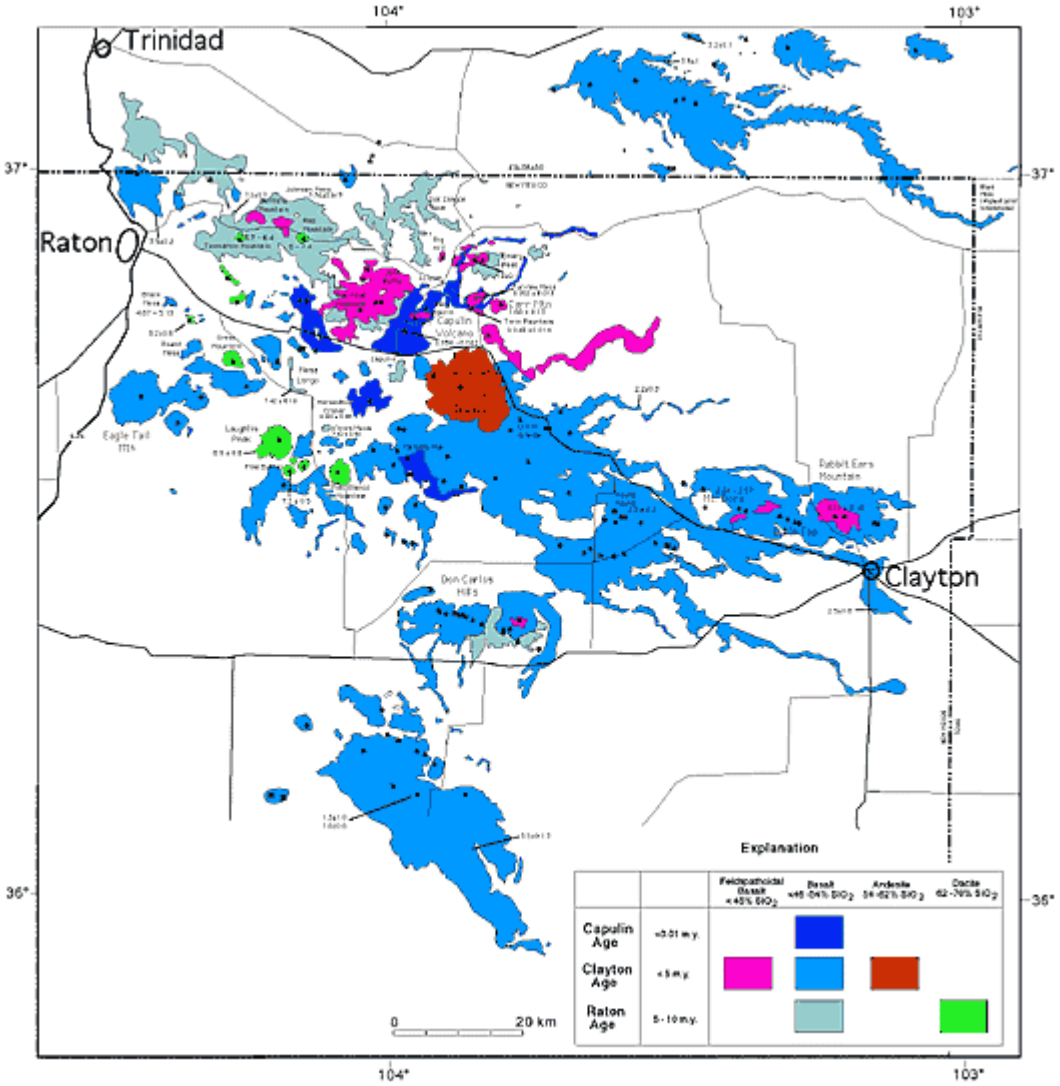
General Reference Information

Raton-Clayton (Capulin Volcano) Volcanic Field

Expanded Discussion about the Raton-Clayton field

The Raton-Clayton volcanic field lies at the northeastern end of the "Jemez lineament", a prominent alignment of volcanic fields extending from the Pinacate field of Mexico, through the Springerville field on the southern margin of the Colorado Plateau in eastern Arizona, the Zuni-Bandera field, the Mount Taylor field, the Jemez field, and Cerros del Rio Field, and terminating in the northeastern corner of New Mexico in the Raton-Clayton field (Figure 1A & B). Some studies also include the Taos volcanic field as part of the general trend as well. In fact, the Taos field bears many similarities with the Raton-Clayton field in terms of age, morphology of silicic vents, and compositions. Because the alignment of fields in the Jemez lineament is parallel to the Snake River-Yellowstone hot spot track, the Jemez Lineament also has been considered by some to be a type of hot spot. As such the Raton-Clayton "hot spot" is one of only 49 hot spots identified on Earth (Figure 2).It should be clarified that the status as a true hot spot is not clear-cut largely because there is no strong age progression, for example, from southwest to northeast, as is typical of true hot spot tracks.

There are many volcanic fields of late Cenozoic age throughout the Southwest, each of which is distinctive in terms of the details of petrology, timing of eruptions, size, and morphology of vents, and character of pyroclastic deposits. But overall, they are all characterized by many small centers of eruption (one to a few kilometers across) of fundamentally basaltic, but ranging to more silicic, compositions. Instead of one big volcano, volcanic fields are typically on the order of one hundred kilometers across, and contain from several tens of vents to several hundred volcanic vents erupted over a period of several million years. Volcanic fields also differ from single large volcanoes, like Hawaii or the large volcanoes of the Cascades. They are also characterized by low rates of magma eruption, typically an order of magnitude less than large volcanoes. The Raton-Clayton field is elongated northwest-southeast, the axis extending from near Trinidad, Colorado, 140 km southeastward to Clayton, New Mexico (Dungan, et al, 1989). Including the outlying parts, the field covers nearly 20,000 km2 (Figure 3) (Stormer, 1987; Muehlberger, et al, 1967). The oldest rocks range from about 9 Ma and the youngest erupted less than 60,000 years ago (Sayre et al, 1995; Stroud, 1996). The distinctive characteristic of the Raton-Clayton field is the presence of highly alkalic mafic lavas with SiO2 contents as low as 36%. However, the field also contains centers, such as Sierra Grande, that erupted andesite, dacite or rhyodacite (up to nearly 70% SiO2).



RATON-CLAYTON VOLCANIC FIELD

Click on the image above for a larger view.

Phases of Volcanic Activity (Stratigraphy) in the Raton-Clayton Volcanic Field

Traditionally the RCVF has been divided into three main phases of volcanic activity (Baldwin and Muehlberger, 1959; Muehlberger, et al, 1967). As a result of recent age radiometric determinations (Stroud, 1996), the ages of these phases are now known to be older than reported in earlier published accounts. Nonetheless, the basic stratigraphy remains adequately defined by three periods. (Note: The following is from Mathis, 1997.)

Raton Phase 9.0 - 3.5 Ma

Capulin Phase1.7 - 0.04 Ma

These are defined in part by a sequence of inverted topography in which the older units are situated on earlier and now higher erosion surfaces, and subsequent eruptions were emplaced on younger and lower surfaces.The earliest lavas of the Raton-Clayton field flowed onto the surface of an alluvial apron of sediment shed eastward from the Sangre de Cristo Mountains (which are to the west of the field) (Baldwin and Muehlberger, 1959; Dungan, et al, 1989). Continuing uplift during eruption resulted in the erosion of this surface where it was not capped by volcanic rocks. During subsequent eruptions, lava flowed down valleys cut into this surface. The result is a series of "inverted topographic valleys" such that the oldest volcanic rocks are generally found at the highest elevations above present erosional levels, with younger lavas at progressively lower levels and in modern drainages. Thus the field is characterized by a kind of inverted stratigraphy.

The rate of down-cutting has been significantly greater in the western part of the field along the head of valleys draining into the Canadian River. The high, lava-capped mesas in the distance to the north are over 700 m above the valley floor. To the east, the elevation of the older basalt-capped mesas decreases, and at Clayton they are only a few meters above the present valley floors.

Raton-Clayton (Capulin Volcano) Volcanic Field

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