

GEOLOGY OF THE EL MORRO AREA

The Zuni Mountains north of El Morro are the remains of an anticline (uplift) that occurred about 70 million years ago. Much of the overlying sedimentary rock has been eroded, exposing some of the oldest rocks in New Mexico in the central core of the mountains. These are similar to rocks found in the Grand Canyon, which are over one billion years old.

At the close of the Ice Age (1 million years ago) the Zuni Mountains looked much as they do today. The vegetation was more dense and varied, due to greater precipitation, and animal life consisted of woolly mammoth, camel, bison, and giant sloth's.

El Morro is a remnant of the sedimentary rocks that have been eroded from the Zuni Mountains. About 180 million years ago a great desert covered the entire 4-Corners region, lasting for about 45 million years. Then, about 130 million years ago, the ocean advanced and retreated over this same area for a period of 65 million years. The desert dunes now make up the Zuni Sandstone (the high cliffs of El Morro) and the later ocean and lagoon deposits comprise the Dakota Sandstone (the caprock on El Morro).

Where as the Zuni Sandstone is soft and porous (water moves rapidly through it), the Dakota Sandstone that caps the Zuni, is harder and more resistant to water. El Morro's many sheer cliffs indicate relatively recent exposures. A system of "joints" or cracks provide avenues for water. Freezing and thawing wedges huge blocks until they break off. The Park Service is monitoring one such block on the south side of El Morro. When a block does break away, it leaves an unweathered, relatively smooth, vertical cliff.

Color is one reliable way to differ between the formations: light for the Zuni sandstone and usually darker for the Dakota. There is one layer of Dakota that is white due to a high concentration of calcium carbonate. The quartz sand grains in the Zuni sandstone have a higher degree of rounding and are more uniform in size.

Three miles northwest of El Morro are several erosional remnants of Zuni sandstone forming statue like features called Los Gigantes (the giants). Here the sandstone is banded red and white in contrast to the yellowish tint of El Morro. Banding is common in the Zuni Sandstone. It is very pronounced near Zuni in Towa Yalline (the sacred Corn Mountain of the Zunis). The difference in colors are caused by the amount of iron minerals, ground water, and climatic conditions during the deposition of sediments.

Within the last 3,000 years, a number of cinder cones and lava flows along the southeastern end of the Zuni Mountains were formed. These produced the lava that can be seen in the El Morro area. Although most of these flows are now covered by soil, the youngest is less than 1,000 years old. Bandera Crater, near the ice caves (20 miles east of El Morro), is one of the youngest cinder cones in the U.S. One of it's lava flows created a tube about 17.5 miles long and is the longest tube known in the southwest. Much of the tube has since collapsed, but numerous caves filled with ice still exist. The age of the ice is not known, but it certainly postdates the basalt (lava), and could be as old as 3,000 years. Conditions are just right for ice inside the caves because they stay an average temperature of 31 degrees fahrenheit day and night, winter and summer.

The El Morro area is excellent for an introductory study of Physical Geology. Sedimentary rock formations are well exposed in many places. Excellent examples of recent lava flows, lava tunnels, cinder cones and other igneous activity are easily accessible along State Highway 53 that runs by Inscription Rock.