

2010 Earth Science Week KUNM radio broadcast

The Rio Grande Rift

Adam Read

Welcome to Earth Matters...field notes on the geology of New Mexico's enchanting landscapes. Celebrating Earth Science Week, I am Adam Read.

A river runs through it now, but it wasn't always so. The Rio Grande flows in a valley formed by what geologists call the Rio Grande Rift, which extends some 600 miles from Colorado into Mexico.

Rifts form when tectonic forces pull apart the massive plates that make up continents. As this happens, the crust becomes faulted, mountains rise, and keystone-like blocks sink to form basins that geologists call grabens. As the crust stretches, it gets thinner. This increases the heat flow from the Earth's interior and melts rock that rises to form volcanoes – like those on Albuquerque's west side.

Faulting removes weight from the edges of the rift causing mountain blocks to rotate. It's like having a raft loaded with rocks, and then shoveling the load from only one side of the raft onto the dock. As the load shifts, the raft will tilt away from the dock. The next time you look at the Sandia Mountains, think about how this huge block of rock has tilted like a hinge as rifting has unloaded rock from the Albuquerque side.

Most valleys, like the Grand Canyon, are carved by rivers, but rift valleys are different. Instead, rivers have filled the deep holes created by our rift for the last 30 million years with thick deposits of mud, sand, and gravel. About 600,000 years ago, individual rift basins were filled enough that the Rio Grande connected them and began flowing into the Gulf of Mexico. Since then, the Rio Grande has cut into the sediments it worked so hard to deposit – creating the fertile inner valley of our bosque.

Because continental rifts accumulate sediments, they can preserve remains of ancient creatures as fossils. The Rio Grande valley contains remains of extinct camels, mammoths, horses, and ground sloths – all attracted by water sources in the rift during the last ice-age.

Celebrating Earth Science Week, I am Adam Read of the New Mexico Bureau of Geology at New Mexico Tech.