

# A Multidisciplinary Investigation of Rio Grande Rift Deformation

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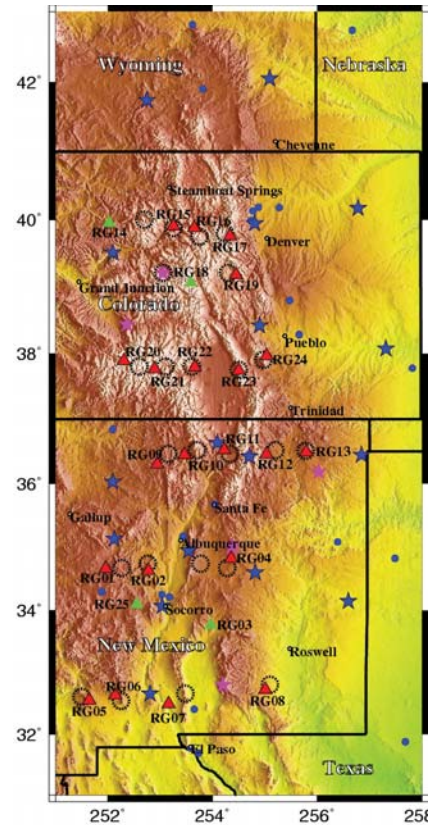
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The Rio Grande rift (RGR) is the easternmost actively deforming province on North America's western margin. The character of rifting changes from north to south, with a single narrow rift valley in Colorado and northern New Mexico grading to a broad "basin and range" expression in south-central New Mexico. This expression is not well understood, but may have significant bearing on our understanding of how and why continental lithosphere extends and of earthquake and volcanic hazards in rift zones. Copious geophysical data make this region an ideal laboratory in which to study the roles of lithospheric rheology, plate boundary forces and local buoyancy in active continental rifting [e.g., Roy et al., 2005]. However, existing data are ambiguous about processes, rates and spatial distribution of RGR extension. For example, mantle seismic expression of the rift may be narrow or wide depending on whether one assumes  $V_p$ ,  $V_s$  or  $Q$  anomalies as a proxy [Boyd and Sheehan, 2005]. Existing geodetic and geological data suggest rates ranging from 0.3 to 5 mm/yr extension, with uncertainties as large as the signal.

Complementary to PBO–EarthScope deployment of coarsely spaced continuous GPS instruments in the RGR region, and with expertise and support provided by UNAVCO, we are installing a focused deployment of 25 quasi-continuous GPS sites in five dense profiles to study the nature of continental rifting (Figure 1). As of February 2007, 21 of the sites are installed and collecting data (Figure 2). Another two are ready for installation as soon as weather permits, and two more are in late stages of reconnaissance with plans to install this spring. Current research focuses on improving estimates of atmospheric effects and multipath in GPS positions, to better capture the extremely low signal.



**Figure 1.** Triangles are site locations in the Rio Grande Rift GPS network; the red triangles are already installed and collecting data. Plate Boundary Observatory stations are shown as stars (blue are installed, purple are planned). Blue circles are locations of other GPS network sites.



**Figure 2.** Rio Grande Rift GPS station at Great Sand Dunes National Park. Photo courtesy Nicole Feldl.

#### References

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