

# ***Basins of the Rio Grande Rift: Structure, Stratigraphy, and Tectonic Setting***

edited by **G. Randy Keller and Steven M. Cather**, 1994, Special Paper 291, the Geological Society of America, paperback, 304 pages, ISBN 0-8137-2291-8, list price \$72.50.

## **Review by Christopher G. Kendall**

The book consists of some 19 papers which were given at a symposium during the 1991 joint meeting of the Rocky Mountain and South Central sections of the Geological Society of America. The symposium was focused on the stratigraphy and tectonics of Rio Grande rift, examining it southward from central Colorado to west Texas and the state of Chihuahua in Mexico. These papers describe a rift zone that matches the size and continuity of the rifts of Kenya, the Baikal and the Rhine, and has the geological and geophysical characteristics similar to these of other world rift zones. However in contrast with these other rifts, petroleum exploration has provided a source of both well and seismic reflection data, which coupled to recent regional mapping of the Rio Grande rift has led to the establishment of a high quality data base which is in many ways better than the information from the other rifts. The papers in the volume are essentially in order of geographic occurrence and start with papers for the northern portion of the rift valley in northern Colorado and end with papers in the southern portion of the rift valley, with a final paper on the Big Bend segment of the Rio Grande rift in the Trans-Pecos of Texas. As pointed by the editors, the northern and central portion of this rift have been most intensively studied and so this is where most of the papers in this book are concentrated, reflecting the greater petroleum exploration of this section of the rift. Thus many of the papers of this region are illustrated with clear seismic cross-sections, many interpreted and some uninterpreted. Similarly a number of stratigraphic sections are provided which are based on well data and there are a numerous clear geological maps which both show the geology and depth to different formations, and their structural character for the different portions of this rift zone. The book will be a great use to those who are interested in the tectonic style of this rift valley and the broad generalities of the stratigraphy of the sediments that fill this feature. Most of the thrust of the papers in the book are aimed at the structural style of this rift, but many contain extensive stratigraphic information on the nature of sedimentary fill along the rift valley.

I would argue the book is of more interest to people needing information on the regional tectonism and geology of the Rio Grande rift than those needing a book on structural styles associated with rift valleys and their origins. The text is largely descriptive with some emphasis on the interpretation. However for the geologists or geophysicists who are more interested in the mechanisms involved in the development of rifts and stratigraphy and tectonic style of rifts, this book can still be a source for this information while it is in itself it is not specifically aimed at unraveling rift mechanisms. It can also be used as a source book for further data for the Rio Grande rift, particularly since the papers in this volume contain so many references to both historical and recent publications on the area.

After the introduction to the text, the book begins with a paper on tectonic setting of the axial basins of the northern and central Rio Grande Rift and then focuses on the depth and geometry of the northern Rio Grande Rift in the San Luis Basin of South Central Colorado. This is followed by paper on the Tertiary stratigraphy and tectonic development of the Alamosa basin, which is in the northern San Luis part of Rio Grande Rift in South-Central Colorado. Next is a paper on the variation in Paleomagnetic rotations and kinematics of the North-Central Rio Grande Rift, New Mexico. Then come four papers on the Albuquerque basin including one on the Cenozoic stratigraphy, sandstone petrology, and depositional history of

the Albuquerque basin in Central New Mexico; another on the structure and tectonics of the Albuquerque basin segment of the Rio Grande rift with insights from reflection seismic data; one on the thickness of the syn-rift Santa Fe group in the Albuquerque basin and its relation to structural style; and finally one on footwall unloading and rift shoulder uplifts in the Albuquerque basin and their relationship to the syn-rift conglomerates and apatite fission-track ages. Following are papers on portions of rift further south including one on crustal extension in the Rio Grande rift, New Mexico, and another on half-grabens, accommodation zones, and shoulder uplifts in the Ladron Peak-Sierra Lucero Area, (essentially a portion of the southern Albuquerque basin). Next is a paper on the stratigraphic consequences of the episodic extension in the Lemitar Mountains, Central Rio Grande rift; a paper on an integrated geophysical study of the Estancia basin, Central New Mexico; a paper on structural and tectonic evolution of the Joyita Hills, Central New Mexico: implications of basement of control on Rio Grande rift; a paper on crustal structure of the western margin of the Rio Grande rift and Mogollon-Datil volcanic field, Southwestern New Mexico and Southeastern Arizona; a paper on Winston graben: stratigraphy, structure and tectonic setting; a paper on crustal structure and basin geometry in South-Central New Mexico; a paper on late Pliocene and early Pleistocene sedimentation as influenced by intrabasinal faulting, Southern Rio Grande rift; a paper on Tertiary and Quaternary tectonics of the Hueco Bolson, Trans-Pecos Texas and Chihuahua in Mexico; and finally a paper on basins in the Big Bend segment of the Rio Grande rift, Trans-Pecos Texas.

This volume has been professionally put together and has been tightly edited. The papers tend to be short, are to the point and are extremely well illustrated. Readers will not be disappointed should they purchase the book to help them unravel the geology tectonic style and sedimentary fill of this rift valley. It should be a great addition to your library if you are studying this region and need further background information for the area. It certainly should be in your local university or company library if you are pursuing the geology of the Rio Grande rift. It could be a good source of information to those of you who are studying the structural style of rift zones and trying to establish a feeling for structural styles and sedimentary fills which may be expected in the rift zones. For such an enormous area this is a relatively thin but elegant book which is packed with facts. The authors, editors and Geological Society of America should be congratulated for such a professional text.