Provenance Trends from Modern Tributaries Along the Western Margin of the Rio Grande Rift, Implications for Drainage Development Post ~1 Ma

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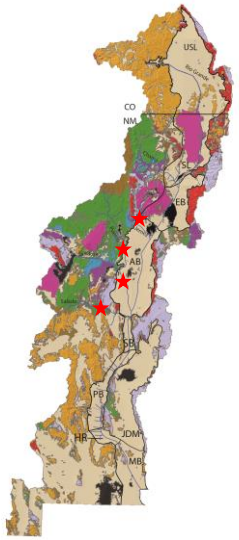
(1) Introduction

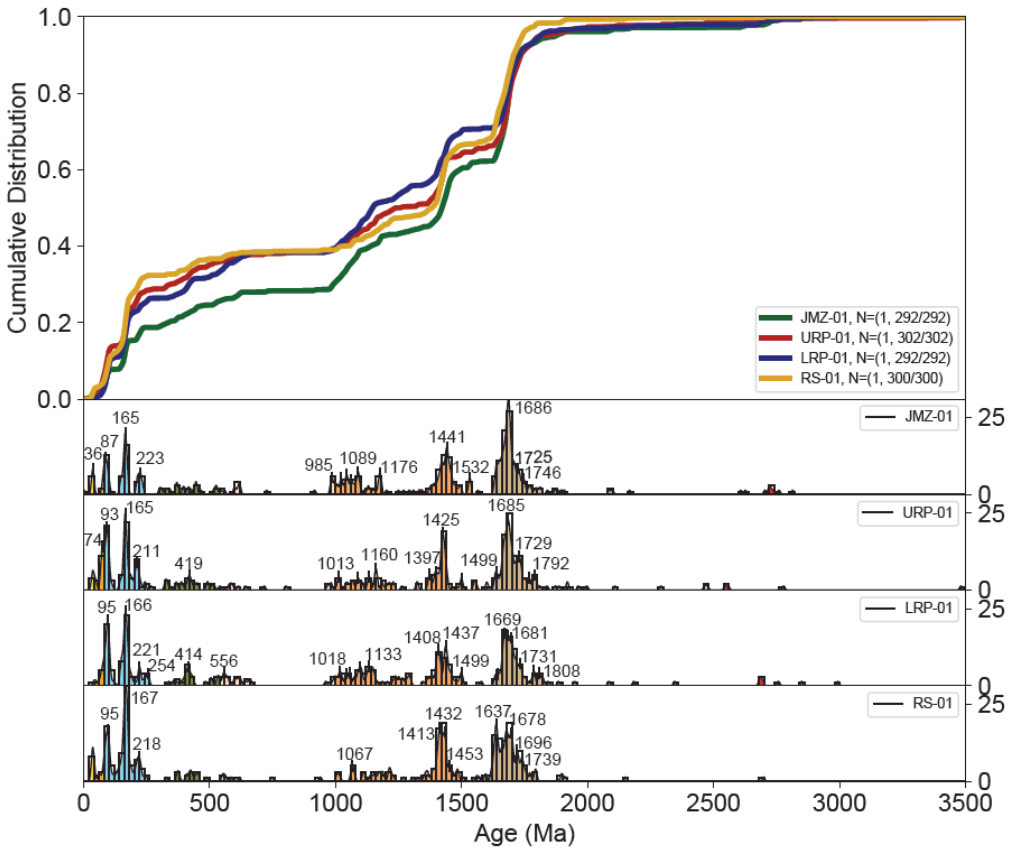
The Rio Grande rift is a late Cenozoic continental zone of extension that acts as the headwaters for the Rio Grande fluvial system and extends from southern Colorado, through New Mexico, into west Texas. Previous studies have focused on the Plio-Pleistocene history of drainage evolution, yet little is understood about the history of drainage formation over the last ~1 Ma. This study focuses on the modern sediment in headwater streams along the western margin of the Rio Grande rift. New U-Pb detrital zircon samples were collected and analyzed from the modern Jemez, Rio Puerco, and Rio Salado drainages to determine primary and recycled source areas contributing detritus to the modern drainages. Comparison of modern drainages to Plio-Pleistocene axial fluvial strata of the ancestral Rio Grande helps constrain the timing of tributary evolution along the western margin of the Rio Grande rift.

(2) Study Area

Detrital zircon samples were collected from modern tributaries along the western margin of the Rio Grande rift. The Jemez River is the furthest upstream locality in this study and enters the Rio Grande in the Santa Domingo basin. the Rio Puerco is located to the south of the Jemez river and enters the Rio Grande in the Albuquerque basin. The Rio Salado is the southernmost locality in this study and enters the Rio Grande in the Socorro basin.



(3) Results



Data was analyzed using DetritalPy software. The Jemez River records peak ages at 1725, 1686, 1441, 1089, 223, 165, 87, and 36 Ma. Samples collected above the confluence of the Rio Puerco and Rio San Jose exhibit peak ages at 1729, 1685, 1425, 1160, 419, 165, 93, and 74 Ma. Samples collected below the confluence of the Rio Puerco and Rio San Jose exhibit peak ages of 1731, 1669, 1437, 1133, 556, 414, 166, and 95 Ma. The Rio Salado exhibits peak ages at 1739, 1678, 1637, 1432, 1067, 218, 165, and 95 Ma.

(4) Discussion

Peak ages of modern tributaries overlap with Precambrian and Phanerozoic source areas exposed in the Southwestern US. All samples overlap with crystalline basement sources of the Yavapai, Mazatzal, and A-type Granitoid provinces that crop out in central New Mexico. Occurrences of Neoproterozoic-Grenville, and Cordilleran magmatic arc zircons likely represents recycling of Mesozoic strata exposed along the southeastern margin of the Colorado Plateau. Eocene-Oligocene zircons overlap in age with the San Juan and Mogollon Datil volcanic fields in southern Colorado and New Mexico.

The highest occurrences of Jurassic–Cretaceous aged zircons occur in central New Mexico in the Rio Puerco and Rio Salado drainages. Zircons that overlap in age with Eocene–Oligocene volcanic fields in New Mexico are rare, and occur only in the Jemez, and Rio Salado drainages. Plio-Pleistocene zircons are absent in the Rio Puerco and Rio Salado and are limited to a single occurrence in the Jemez River.

A comparison of these data with previously published detrital zircon ages from Plio–Pleistocene strata from the ancestral Rio Grande show upsection changes in provenance and evolution of drainage development since the last ~1 million years.

References

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