

## **Basin-fill Architecture of the Pliocene-Lower Pleistocene Palomas Formation Adjacent to the Intrabasinal Mud Springs Mountains, Southern Rio Grande Rift**

**Ron Foster and Greg H. Mack**

*Geological Sciences, New Mexico State University, MSC 3AB, Las Cruces, NM 88003-0001, [ron@nmsu.edu](mailto:ron@nmsu.edu)*

Incised Pliocene-Lower Pleistocene strata of the Palomas Formation provide a nearly three-dimensional view of basin-fill architecture adjacent to the intrabasinal Mud Springs Mountains within the eastward-tilted Palomas half graben, southern Rio Grande rift, New Mexico. The strata were divided into five facies assemblages that were mapped at the scale of 1:10,000. The assemblages represent four dispersal systems: (1) the ancestral Rio Grande, (2) Black Range hanging wall-derived alluvial fans, (3) Mud Springs Mountains footwall scarp-derived alluvial fans, and (4) Mud Springs Mountains dip slope-derived alluvial fans. In addition, a fine-grained facies assemblage was deposited adjacent to the dip slope of the Mud Springs Mountains on Black Range-derived alluvial flats and/or on the Rio Grande floodplain.

Six stages of deposition were defined, based on the location and interaction of the facies assemblages. Whereas the Mud Springs fault along the southeastern flank of the Mud Springs Mountains was inactive during deposition, activity on the Caballo-Hot Springs fault system tilted the half graben, driving the axial river and Black Range-derived fans toward the Caballo Mountains.

Progressively less precipitation in the region, based on an increase through time in  $\delta^{13}\text{C}$  values of pedogenic and groundwater calcite, may have decreased sediment yields from the small, low-elevation catchments in the Mud Springs Mountains. This inhibited progradation of Mud Springs-derived alluvial fans, allowing the fine-grained facies assemblage to onlap the dip slope. Larger, higher-elevation catchments in the Black Range were probably less affected by the paleoclimate change, and their alluvial fans were active throughout Palomas Formation deposition.