A north-flowing Miocene (?) ancestral Pecos River in southeast New Mexico: a record of Late Paleogene-Early Neogene epeirogeny

S. M. Cather

The Gatuña Formation of southeastern New Mexico consists of fluvial and eolian deposits within the modern valley of the Pecos River and nearby areas to the east and west. The Gatuña is poorly dated; it contains ~13 Ma and 0.6 Ma volcanic ashes (Powers and Holt, 1993 NMGS guidebook) and is capped with calcretes that range in age from several million years to ~0.5 Ma (Hawley et al., 1993 NMGS guidebook; Powers and Holt, 1993 NMGS guidebook). On-going provenance, paleocurrent, and facies analyses of the Gatuña Formation show the presence of a light pink to gray axial fluvial facies near the modern Pecos River and intercalated reddish-brown alluvial and eolian deposits that accumulated in local transverse drainages. Clasts in the axial fluvial facies are typically well rounded and consist of diverse lithotypes including carbonate, sandstone, chert, quartzite, volcanic rocks (andesite, rhyolite), hypabyssal intrusive rocks, and basement lithotypes (granite, gneiss, schist).

Previous workers interpreted the axial fluvial facies of the Gatuña Formation as deposits of south-flowing rivers. This interpretation derives from the close geographic association with the modern south-flowing river and the southward-decreasing elevation of the basal Gatuña (e.g., V.C. Kelley, 1980, NMGS guidebook). This latter attribute, however, is clearly influenced by solution-subsidence effects, as the base of the Gatuña south of Carlsbad commonly lies in sinkholes far below the grade of the modern Pecos.

Several lines of evidence indicate the axial fluvial facies of the Gatuña Formation was deposited by north-flowing rivers: (1) All axial facies outcrops thus far examined in the Loving-Malaga area (upper and lower Pierce Canyon, NM 31 bridge, Herradura Bend) show unambiguous pebble imbrications indicative of northerly paleoflow; (2) About 10–20% of the volcanic clasts are rhyolite, and some of these show eutaxitic textures typical of ignimbrite. Of the potential sources of coarse volcanic detritus near the Pecos drainage (the Ortiz, Sierra Blanca, and trans-Pecos volcanic fields), only the transPecos contains substantial volumes of rhyolite; (3) Although the Proterozoic Ortega Quartzite is the dominant resistant lithotype in the headwaters of the modern Pecos drainage, clasts of this distinctive lithology are not present in the Gatuña Formation.

Northerly paleoflow in the ancestral Pecos axial system of southeastern New Mexico may reflect late Oligocene-early Miocene epirogenic uplift and northward tilting of the southern High Plains. This uplift caused ~1–2 km deep erosion in southeastern New Mexico after intrusion of the 28.8 Ma Capitan pluton and before the beginning of deposition of the Ogallala Group at ~13 Ma. Uplift was contemporaneous with that of the southern Colorado Plateau, and may have resulted from mantle-buoyancy effects related to voluminous ignimbrite volcanism in the Sierra Madre Occidental.

Keywords:
uplift, sedimentary rocks, fluvial deposits, eolian,

2011 New Mexico Geological Society Annual Spring Meeting
April 15, 2011, Macey Center, New Mexico Tech campus, Socorro, NM
Online ISSN: 2834-5800