FALL 2026 | VOLUME 47, NUMBER 1

New Mexico GEOLOGY



NEW MEXICO BUREAU OF GEOLOGY AND MINERAL RESOURCES

Contents

Stratigraphy, Geochronology, Paleoenvironments, and Depositional Controls of the Lower–Middle Santa Fe Group along the Ceja del Rio Puerco, Northwestern Albuquerque Basin, New Mexico

Daniel J. Koning, Julia Ricci, Matthew T. Heizler, Sean D. Connell, Jeremy K.C. Rugenstein, and Gary S. Morgan

The Santa Fe Group underlies the Albuquerque Basin and forms the regional aquifer for the cities of Albuquerque and Rio Rancho. We describe lithostratigraphic units of the 400- to 600-m-thick lower–middle Santa Fe Group exposed along the bluffs of the Ceja del Rio Puerco, 16–20 km west of Rio Rancho. Integration of new $^{40}Ar/^{39}Ar$ ages with preexisting age control (vertebrate fossils and magnetostratigraphy) allows us to decipher the geologic history of the northwestern Albuquerque Basin between 20 and 9 Ma. Stratal accumulation rates and tilt-rate estimates indicate syntectonic deposition, with reduced tilt and stratal accumulation rates after 14 Ma. In the lowest unit, the Zia Formation, an eolian dune field transitioned to fluvial-dominated sedimentation by 18.1 Ma. The paleogeographic setting of the northwestern Albuquerque Basin during 18.1–9 Ma reflected a spatial transition from a southeastern basin floor to a western piedmont slope and a northern, broad fluvial fan. The middle unit, the sand-dominated Cerro Conejo Formation, contains a cryptic unconformity or condensed section (spanning 2.0–2.5 Myr) within 30 m above its base. In the upper unit, the Arroyo Ojito Formation, we propose the Benavidez Member for the western-piedmont unit where it contains ≥1% gravel. Between 13 and 10 Ma, the western piedmont prograded eastward more than 4 km, possibly due to paleoclimate changes and/or increased displacement rates on intrabasinal normal faults to the east.



Photograph of the Zia Formation offset by the west-dipping Pilares fault zone, located in the Ceja del Rio Puerco about 20 km northwest of Rio Rancho. The view is to the north, and the juniper trees on the ridge are about 2 m tall. A west-down (normal) sense of motion is indicated by the juxtaposition of the younger Cañada Pilares Member of the Zia Formation against the older Piedra Parada Member. Photograph taken by Sean Connell using an uncrewed aerial vehicle. This outcrop is on restricted Pueblo of Santa Ana land, and the photo is used with the kind permission of the Pueblo.

New Mexico GEOLOGY

FALL 2026 | VOLUME 47, NUMBER 1

A publication of the
NEW MEXICO BUREAU OF GEOLOGY
AND MINERAL RESOURCES

A research and service division of
NEW MEXICO INSTITUTE
OF MINING AND TECHNOLOGY

Science and Service
ISSN 2837-6420

Dr. Michael Jackson
President, New Mexico Tech

Dr. J. Michael Timmons
Director and State Geologist,
New Mexico Bureau of Geology

801 Leroy Place
Socorro, New Mexico 87801-4796
(575) 835-5490

BOARD OF REGENTS

Ex Officio

Michelle Lujan Grisham
Governor of New Mexico

Stephanie Rodriguez
Cabinet Secretary of Higher Education

Appointed

Dr. David Lepre Sr.
President, 2021–2026, Placitas

Jerry A. Armijo
Vice President, 2003–2026, Socorro

Dr. Yolanda Jones King
Secretary/Treasurer, 2019–2030, Moriarty

Dr. Srinivas Mukkamala
Regent, 2023–2028, Albuquerque

Cody Johnston
Student Regent, 2025–2026, Socorro

Geological Editor: Shari Kelley
Copyediting: Carrin Rich, Frank Sholedice
Layout and Production: Sabrina Blackwell
Publications Program Manager: Barbara J. Horowitz

New Mexico Geology is an online publication available as a free PDF download from the New Mexico Bureau of Geology and Mineral Resources website. Subscribe to receive email notices when each issue is available at geoinfo.nmt.edu/publications/subscribe.

Editorial Matter: Articles submitted for publication should follow the guidelines at geoinfo.nmt.edu/publications/periodicals/nmg/NMGguidelines.html.

Address inquiries to Shari Kelley, Geological Editor, New Mexico Bureau of Geology and Mineral Resources, 801 Leroy Place, Socorro, NM 87801. Inquiries may also be made by calling (575) 835-5306 or emailing nmbg-nmgeology@nmt.edu.