ANALYSIS OF PROXIMAL SYNTECTONIC PENNSYLVANIAN DEPOSITS YIELDS DEFINITIVE EVIDENCE OF MAJOR PHANEROZOIC SLIP ON PICURIS–PECOS FAULT, NORTH-CENTRAL NEW MEXICO

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We studied the provenance, paleocurrents, sedimentary facies, and paleontology of Pennsylvanian coarse-grained, syntectonic deposits immediately east of the Picuris–Pecos fault (PPF) to test hypotheses for the timing of the 37-km dextral separation of Proterozoic lithotypes and structures on the PPF. Near the Rio Chiquito on the northern flank of the Truchas uplift, a well-exposed, 394-m thick succession of mostly fluvial sandstone, conglomerate, and talus breccia abuts the PPF, and consists entirely of detritus derived from the metasedimentary Hondo Group. These deposits, which we correlate to the Flechado Formation, display southeasterly paleocurrents and fine markedly to the east. We interpret them as fault-scarp deposits. The unit intertongues upsection with marine shales that contain a latest Atokan–early Desmoinesian brachiopod fauna. A limestone 80 m above the top of the Flechado Formation contains the early Desmoinesian fusulinids Beedeina and Wedekindellina. The nearest potential source terrane for the metasedimentary detritus in the Flechado Formation is in the Picuris Mountains, now dextrally separated from the Rio Chiquito exposures by at least 20 km. Immediately west of the PPF at Rio Chiquito, fine-grained, mostly arkosic Pennsylvanian beds overlie granite-gneiss. These relationships require ≥20 km of post-Atokan dextral slip on the PPF, which is supported by a ~70–90° clockwise rotation of strike of bedding in the Flechado Formation near the fault.

South of the Truchas uplift, ongoing studies of poorly exposed Pennsylvanian conglomeratic strata east of the PPF show a southward transition from quartzarenite (Ortega Quartzite provenance) to arkose (granite-gneiss and metavolcanic provenance) just south of Cave Creek in the Pecos Wilderness. Paleocurrent data indicate that these Pennsylvanian sediments were derived from west of the PPF. The Pennsylvanian quartzarenite–arkose transition approximately overlies the southern limit of the metaquartzite terrane in the subsurface east of the PPF. It thus appears that no dextral fault separation of the southern boundary of the metaquartzite terrane existed in the Early Pennsylvanian.

Our results provide definitive evidence that at least 20 km, and probably all, of the 37-km dextral separation on the PPF occurred after the Early Pennsylvanian.

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