POSSIBLE IMPACT STRUCURE IN THE SANGRE DE CRISTO MOUNTAINS NEAR SANTA FE, NEW MEXICO: A PRELIMINARY REPORT

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In 2005, probable shatter cones of cm-decimeter size were discovered by one of us (McElvain) in road cuts recently cleaned by heavy rains, on the well traveled road from Santa Fe to the Santa Fe Ski Basin. They occur in Proterozoic biotite schist (Bauer et al., unpubl. prelim. geol. map, Santa Fe quad, NM Bur. of Geol.) as imperfectly formed clusters discordant to foliation, and as more perfectly formed cones in cross-cutting granite. Nearby, over an area of at least 3 sq km, a breccia blanket, up to 75 m thick, of m-size clasts of Proterozoic crystalline rocks (some cut by microcataclasites) in a soft (altered?) matrix, unconformably overlies Proterozoic rocks (Read et al., unpubl. prelim. geol. map, McClure Reservoir quad, NM Bur. of Geol.). Over most of its extent, the breccia appears to be conformable with the overlying Pennsylvanian rocks (Sandia Fm.). Locally, pockets of Mississippian carbonates are preserved beneath Pennsylvanian strata and the breccia may be interlayered with them. The breccia is clearly post-Proterozoic and pre-Pennsylvanian; it may be Missippian.

In evaluating the breccia as a possible ejecta blanket, complications arise. The area has been involved in at least three major post-Proterozoic tectonic disturbances, each of which produced breccias: (1) Rise of the Ancestral Rockies (Mississippian-Pennsylvanian), (2) Laramide orogeny (late Cretaceous-early Tertiary) and (3) extension of the Rio Grande rift (Miocene to Quaternary). In addition, dissolution of Mississippian carbonates left residual breccias. The most likely alternative to an ejecta blanket would be a landslide or colluvial deposit, eroded off an Ancestral Rockies uplift. Less likely are breccias along normal and strike-slip faults related to the Laramide orogeny or Rio Grande rift, even though some of them have displacements of km or even tens of km. At fault contacts between competent Proterozoic crystalline rocks and relatively incompetent Paleozoic sedimentary, the clasts would probably be of the incompetent variety. Clasts of crystalline rocks are unlikely components of a Mississippian karst. Detailed geologic mapping to resolve the nature of the breccia is currently being complemented by evidence for shock in the clasts.