THE LIFECYCLE OF THE EOCENE-OLIGOCENE SCHOOLHOUSE
MOUNTAIN CALDERA, MOGOLLON-DATIL VOLCANIC FIELD,
SOUTHWEST NEW MEXICO

Vanessa Swenton, Tara N. Jonell, Jeffrey M. Amato, and William C. McIntosh

The late Paleogene Mogollon Datil Volcanic field (MDVF) in southwest New Mexico is a manifestation of the widespread Tertiary Ignimbrite Flare-Up that extended from Nevada to the Sierra-Madre Occidental of Mexico. The MDVF contains 12 calderas that previously were postulated to follow magmatic age trends across the southern Basin and Range. However, the 33.5 Ma age for the Schoolhouse Mountain caldera (SMC) is based on dating of a tuff that may post-date the caldera-forming event. We conducted field work, petrology, geochronology, and geochemistry to evaluate the life-cycle of this caldera. Andesite-dacite lava flows, tuff, and intrusions of the Saddlerock Canyon sequence are the oldest caldera units in the area (35.35 ± 0.05 Ma; all dates ⁴⁰Ar/³⁹Ar sanidine) with 64–68% SiO₂. The next sequence, Kerr Canyon, includes rhyolite tuffs (34.71 ± 0.14 Ma), plugs (34.64 ± 0.10 Ma), flows (34.33 ± 0.08 Ma), and a megabreccia that we suggest represents the caldera collapse. The megabreccia consists of a lithic-rich rhyolite matrix with glass, quartz, biotite, sanidine, and plagioclase. Clasts of rhyolite tuff, flow-banded rhyolite, and pumice range from 2 cm to 3 m. Other clasts are Cretaceous quartzarenite and Proterozoic granite. The largest and most abundant clasts are crystal-rich rhyolite. Dating the megabreccia will constrain the age of collapse, a critical stage in the history of the caldera. The next sequence, Mangas Creek, is the thickest and is largely composed of intermediate to felsic tuffs ranging from 60–74% SiO₂. This was followed by the regionally significant McCauley Ranch rhyolite tuff (33.99 ± 0.04 Ma). The rhyolite tuffs and flows of Cherokee Canyon, the rhyolite of Redrock Basin, and the latite tuffs of Greenwood Canyon are the youngest units that are likely to be associated with the SMC. We have acquired preliminary isotopic data potentially showing both relatively uncontaminated parental magma and magma mixed with Proterozoic crust. Further Sr/Nd isotopic analyses on additional units will define variations over time. Results from observed field relationships and high-precision, single-crystal ⁴⁰Ar/³⁹Ar dating on all of the tuffs and megabreccia will establish a more precise timeline for the SMC and, together with field observations, will determine the origin of the Kerr Canyon megabreccia.