Rhyolite tuffs in the Mogollon-Datil volcanic field (MDVF; McIntosh et al., 1991; 1992, hereafter M91, M92) and Boot Heel volcanic field (BHVF; McIntosh and Bryan, 2000) were previously correlated based on \(^{40}\)Ar\(^{39}\)Ar sanidine geochronology and paleomagnetism. For this project we revisited correlations between tuffs and inferred caldera sources for the time period 33.8–33.7 Ma, focusing on the “Box Canyon tuff” (M92). The southwestern MDVF contains exposures of several ~33.7 Ma tuffs, including Luna, Fall Canyon, Cherokee Canyon, “Kneeling Nun of Hedlund, 1978” (not actually Kneeling Nun), “Sugarlump,” Bell Top 6, and Box Canyon. These were grouped as the “Box Canyon tuff” at 33.73 ± 0.13 Ma (M92; formerly 33.51 Ma; all ages recalculated). Most samples were from outflow sheets, but the Cherokee Canyon tuff within the SMC was interpreted as caldera-fill and thus the SMC was inferred as the source of the “Box Canyon” tuffs. McIntosh and Bryan (2000) subsequently noted that the Oak Creek tuff, sourced from the Juniper caldera in the BHVF, also has an age of 33.72 Ma. Thus, there are two potential sources for the 33.7 “Box Canyon” tuff: the SMC and the Juniper caldera.

We tested these correlations using electron microprobe analysis of sanidine. The two stratigraphically highest tuffs in the SMC, McCauley Ranch (33.99 Ma, this study) and Cherokee Canyon (33.84 Ma, this study), yielded average compositions of Or\(_{43}\) and Or\(_{55}\), whereas the Oak Creek (33.72 ± 0.07 Ma, McIntosh and Bryan, 2000), “Kneeling Nun of Hedlund, 1978” (33.8 Ma, M91), and Bell Top 6 (33.8 Ma M91) tuffs have sanidine compositions in a cluster around Or\(_{65}\). The Oak Creek tuff from the Juniper caldera has sanidine more geochemically similar to other “Box Canyon” tuffs than to the Cherokee Canyon tuff of the SMC, and therefore the SMC is not the exclusive source for the “Box Canyon tuff”.

Future work will characterize the other “Box Canyon” tuffs to determine if they represent outflow sheets from the SMC. One potential area is Knight’s Peak, 20 km south of the SMC. There, the JPB Mountain tuff is 36.3 ± 0.6 Ma (U-Pb zircon). The overlying C-Bar Canyon rhyolite tuff did not yield sanidine. The overlying “Kneeling Nun of Hedlund, 1978” is 33.77 Ma (M91) and thus cannot be Kneeling Nun (~35 Ma). This is overlain by the intermediate lava flows of Malpais Hills that yielded a U-Pb age of 32.6 ± 0.4 Ma.

The unrecalculated age of 33.51 Ma (M92) has been long used as the “age” of the SMC (e.g., Chapin et al., 2004). Continuing work on the SMC will determine the age of the caldera collapse and caldera fill deposits.