DETAILED INVESTIGATIONS OF RENDIJA CANYON RHYODACITE, A COMPLICATED VOLCANIC COMPLEX IN THE SIERRA DE LOS VALLES, JEMEZ MOUNTAINS VOLCANIC FIELD, NEW MEXICO

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The Rendija Canyon rhyodacite (RCR) of the Tschicoma Formation is one of many dome and flow complexes in the Sierra de los Valles of the Jemez Mountains volcanic field, New Mexico. The RCR has few previously published ages and was mapped as a lumped geologic unit primarily consisting of coarse porphyritic, quartz-bearing lavas containing additional phenocrysts of alkali feldspar, plagioclase, biotite, clinopyroxene, and hornblende. In 2020 we began a new research effort to remap and date individual eruptive units in the RCR to better characterize 1) the timescale of silicic dome complexes and 2) the source provenances of ongoing detrital sanidine studies. Thus far we have obtained 6 ultra high-precision 40Ar/39Ar ages of sanidine, ~50 thin sections, ~40 EDXRF analyses of broken rock surfaces and 10 XRF/ICPMS whole rock major and trace element analyses.

From these and previous data, we have subdivided the original RCR into 7 map units as follows (oldest to youngest): Upper Guaje Canyon rhyodacite (5.381 ±0.004 Ma), “classic” RCR (4 dates that range 5.062 ±0.006 to 5.038 ±0.003 Ma), Upper Pueblo Canyon rhyolite (UPCR, undated), Vallecito Canyon rhyodacite (4.881 ±0.003 Ma), Garcia Canyon rhyodacite (undated), Skyline rhyodacite (4.69 ±0.17 Ma), and Cañada Bonita dacite (3.52 ±0.23 Ma). Each of these 7 units is texturally, mineralogically and chemically distinct. UPCR is unique because it is fine-grained and forms a small intrusive lens within RCR. Four of the 7 units contain conspicuous mafic enclaves. Importantly, “classic” RCR contains no obvious mafic enclaves, a great aid during field identification.

New work allows us to break out at least 3 subunits of “classic” RCR erupted in a 24 ±7 ka period of activity. Two of the subunits are found at the top and bottom of a large unnamed hill interlayered with ±35 m of debris flow breccia (5.038 ±0.003 and 5.045 ±0.003 Ma, respectively), suggesting a relatively short 7 ±4 ka eruptive hiatus between flows. The debris flow unit appears to consist entirely of eroded RCR. At this time, we can’t unequivocally say that individual subunits of “classic” RCR are mineralogically and/or chemically distinct. “Classic” RCR contains ±7% phenocrysts of clear quartz, large white anorthoclase, smaller sanidine and plagioclase, minor augite, biotite, opaque oxides, and sparse hornblende in a fine-grained gray to black groundmass. In thin sections, quartz is typically resorbed and larger plagioclase is commonly myrmekitic. The groundmass contains abundant acicular orthopyroxene and clinopyroxene ≤0.5 mm long, and rare to very rare tiny crystals ofapatite, titanite, and zircon. Vesicular samples often contain secondary vapor-phase tridymite and display severe oxidation of mafic phases. Acicular groundmass pyroxenes are not found in the 6 newly described map units of the original RCR.

Keywords:
Rendija Canyon, rhyodacite, 40Ar/39Ar, XRF, volcanic domes, Jemez Mountains volcanic field