Ar-Ar phlogopite geochronology of the Navajo volcanic field and the Ship Rock diatreme of northwest New Mexico define a 1.4 Ma pulse of potassic magmatism

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Newly acquired Ar-Ar phlogopite ages indicate a brief but widespread pulse of magmatism at 25.9 to 24.5 Ma in Navajo Volcanic Field (NVF). Covering approximately 30,000 km² of the Four Corners region in the southwestern US, the NVF encompasses numerous diatremes, plugs, dikes, and occasional sills and maars including the well-known Ship Rock diatreme. Petrographically the field is dominated by minette and serpentinized ultramafic microbreccia though outcrops of monchiquite, katungite, and olivine melilitite occur as dikes in small numbers. Published K-Ar ages from the NVF range from 33.9 to 19.4 Ma. Phlogopite separates of six dikes from the Shiprock diatreme along with two dikes and two plugs from other locations throughout the NVF were analyzed in this study by the Ar-Ar method using CO₂ laser and resistance furnace incremental heating. The resulting age spectra were generally flat and a selection of the most precise ages range from 25.9 ± 0.1 Ma at Todilto Park, AZ to 24.4 ± 0.1 Ma at Ship Rock, NM. The selected samples spatially represent the full breadth of the NVF and span a range 1.4 Ma. The narrow range of ages found in this study contrasts with the much wider range of published ages implying the bulk of the NVF was emplaced by a short pulse of widespread magmatism rather than series of temporally spaced eruptions. Additional geochronology will assess whether additional eruptive pulses occurred in the NVF.

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volcanology, volcanic rocks, igneous rocks, diatreme, Navajo volcanic field, Ar-Ar dating, geochronology, phlogopite, magmatism,