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Volcanic History of the Sutter Buttes Volcano, California: Conflict between Stratigraphy and $^{40}\text{Ar}/^{39}\text{Ar}$ Ages

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Using conventional K-Ar methods, Williams and Curtis (1977) documented the timing of volcanism at the Sutter Buttes spanning the period of 2.4 to 1.4 Ma. Based on K-Ar dates, volcanism was considered to have oscillated back and forth in composition from intermediate and silicic and back to intermediate. However, stratigraphic relationships deduced from the Rampart fragmental apron surrounding the Buttes appear to indicate a much simpler sequence in eruptive composition, one that began with small volumes of rhyolite progressing to voluminous dacite and andesite. The conflict of stratigraphic and K-Ar data has been attributed to imprecise analyses in the early attempts in K-Ar dating of young volcanic rocks.

To address this issue, we have made laser and resistance furnace, incremental-heating $^{40}\text{Ar}/^{39}\text{Ar}$ analyses on hornblende extracted from 21 dacitic to andesitic extrusive and intrusive domes as well as fragmental deposits at the Sutter Buttes. These analyses yielded well-behaved release spectra and inverse isochrons that indicate a range in age from 2.2 Ma to about 1.7 Ma, although one andesite yielded a significantly older age of 2.8 Ma. In contrast, single crystal total-fusion $^{40}\text{Ar}/^{39}\text{Ar}$ dating of sanidine from five rhyolitic domes gave analytically indistinguishable dates, ranging in age from 1.55 to 1.58 Ma.

The new dates clearly suggest that instead of an intermixing of volcanic types, the earliest volcanic activity consisted of at least three distinct periods of andesitic eruption, followed by rhyolite domes and fragmental deposits. The explanation for the contrasting evidence between the stratigraphic relationship displayed in the layered fragmental Rampart surrounding the Sutter Buttes and the new dates remains unresolved. Additional field study is underway.