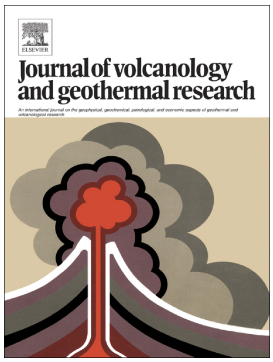

Insights into the emplacement of upper-crustal plutons and their relationship to large silicic calderas, from field relationships, geochronology, and zircon trace element geochemistry in the Stillwater – Clan Alpine caldera complex, western Nevada, USA

Joseph P. Colgan, David A. John, Christopher D. Henry, Kathryn E. Watts

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Insights into the emplacement of upper-crustal plutons and their relationship to large silicic calderas, from field relationships, geochronology, and zircon trace element geochemistry in the Stillwater – Clan Alpine caldera complex, western Nevada, USA

Colgan, Joseph P.[1], John, David A.[2], Henry, Christopher D.[3], and Watts, Kathryn E.[2]

[1]*U.S. Geological Survey, Denver, CO*

[2]*U.S. Geological Survey, Menlo Park, CA*

[3]*Nevada Bureau of Mines and Geology, Reno, NV*

ABSTRACT

Geologic mapping, new U-Pb zircon ages, and new and published $^{40}Ar/^{39}Ar$ sanidine ages document the timing and extent of Oligocene magmatism in the southern Stillwater Range and Clan Alpine Mountains of western Nevada, where Miocene extension has exposed at least six nested silicic calderas and underlying granitic plutons to crustal depths locally ≥9 km. Both caldera-forming rhyolitic tuffs and underlying plutons were emplaced in two episodes, one from about 30.4–28.2 Ma that included the Deep Canyon, Job Canyon, and Campbell Creek calderas and underlying plutons, and one from about 25.3–24.8 Ma that included the Louderback Mountains, Poco Canyon, and Elevenmile Canyon calderas and underlying plutons. In these two 1–2 m.y. periods, almost the entire Mesozoic upper crust was replaced by Oligocene intrusive and extrusive rocks to depths ≥9 km over an estimated total area of ~1500 km^2 (pre-extension). Zircon trace element geochemistry indicates that some plutonic rock can be solidified residual magma from the tuff eruptions. Most plutons are not solidified residual magma, although they directly underlie calderas and were emplaced along the same structures shortly after to as much as one million years after caldera formation. Magma chambers and plutons grew by floor subsidence accommodated by downward transfer of country rocks. If other Great Basin calderas are similar, the dense concentration of shallowly exposed calderas in central Nevada is underlain by a complexly zoned mid-Cenozoic batholith assembled in discrete pulses that coincided with formation of large silicic calderas up to 2500–5000 km^3.