Abstract

The Mojave-Snow Lake fault (MSLF) is a hypothesized structure that accommodated as much as 200 to 400 km of Jura-Cretaceous dextral displacement, bringing Precambrian through Triassic miogeoclinal rocks north from the Mojave Desert to the central Sierra Nevada, where they became “host rock” for the formation of a Mesozoic magmatic-volcanic arc. Our Research Team used geologic mapping, and structural, stratigraphic, geochemical and geochronologic analyses to: 1) test possible links between metasedimentary pendants in the Sierra Nevada to miogeoclinal rocks found in the western Mojave, and 2) to evaluate the temporal and genetic relationships between volcanic and plutonic rocks exposed in the Cinko Lake area. Mapping in the 102 Ma Harriet Lake granodiorite (HLG), 94 Ma Cinko Lake quartz diorite (CLQD), Fremont Lake granodiorite (FLG) and ~148 Ma metasedimentary and ~107 Ma metavolcanic pendants, found no evidence for the large-scale dextral shear needed to bring rocks from the Mojave suggesting that any fault must have been active between ~148 and ~107 Ma and is no longer exposed in this area.

The HLG and FLG plutons and host metavolcanics exhibit distinct, but overlapping chemical trends suggesting a common magma source and comparable but not identical magma lineages. The plutons were emplaced at ~ 2.5 kbars (10 km depth) and the metavolcanic units display considerable vertical ductile strain and peak metamorphic conditions 650-750 °C. The overlapping ages, present juxtaposition, high temperature strain, and similar chemistries suggest that the volcanic rocks formed and then were immediately displaced downwards to 10 km depths where related magmas intruded them, all within less than a few million years.