

# SEG 2022 Conference: Minerals For Our Future

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## Timing of Orogenic Gold-forming Events Related to the Tectonic Evolution of California

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Orogenic gold mineralization within the Sierra Nevada foothills (SNF) and Klamath Mountains (KM) provinces in central and northern California, occurred episodically during ~50 million years of the Late Jurassic through Early Cretaceous and is linked to major tectonic events. Provincial gold mineralization in the KM lasted from ~160–140 Ma, whereas gold mineralization in the SNF lasted from ~160–115 Ma.

Initial gold mineralization impacted the then-contiguous KM-SNF arc at ~160 Ma, coincident with major far-field plate reorganization in the Pacific basin and compressional conditions. The next period of orogenic gold formation occurred at 155–140 Ma, synchronous with sinistral transpression along crustal-scale faults. Beginning around 140 Ma, the KM area was offset westward from SNF and the active arc, leading to the cessation of magmatism and hydrothermal activity within the KM; however, both continued within the SNF.

Sinistral movement along major faults in the SNF persisted until ~125 Ma, when another far-field plate reorganization in the Pacific basin led to a reversal of strike-slip motion along these faults. Most gold deposits of the ~190 km-long Mother Lode belt in the SNF cluster between ~130–125 Ma and are interpreted to be related to this transition to dextral motion along the terrane-bounding faults. A few younger ages suggest another period of gold mineralization at ~115 Ma in the northernmost (Alleghany district) and southernmost (Bagby district) parts of the SNF gold province that correlates to changes in the direction of movement for the Pacific and Farallon plates.

Despite a general overlap in timing of regional post-accretion magmatism and orogenic gold mineralization, there is no genetic link between these two processes. Major age differences between magmatism and mineralization on the local scale are the norm. When magmatism and gold mineralization are temporally correlated, geochemistry of trace minerals indicate that they are not genetically related.