

## **Advances in the understanding of the structural controls on Carlin deposits in Nevada: Implications for Chinese Carlin-like systems**

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Models for the structural distribution of Carlin Deposits in Nevada have generally focused on the localization of orebodies during Tertiary extension near remobilized Paleozoic growth faults. Mining exposures now provide new views which suggest that fold-thrust belt geometry, generated during at least two post-Paleozoic contractional events is widespread in Carlin deposits, and when inverted during Eocene extension, forms a primary control on ore distribution.

Principal ore trends in the Carlin and Cortez areas coincide with structural highs and erosional windows of ore-hosting Silurian-Devonian shelf and slope facies carbonate and siliciclastic rocks through the late Paleozoic, mylonitic Roberts Mountains Thrust (RMT). On the Carlin Trend, widespread probable Jurassic southeast verging folds and thrusts are pervasive, overprinting and displacing the RMT. These earlier structures are offset by north to northwest-trending normal faults which are filled by Jurassic dykes, recording a syn-magmatic extensional event which formed many of the major faults that control later gold mineralization, including the Post-Gen and Castle Reef faults. Their cutting of the RMT and major southeast vergent folds indicate initial formation of these faults in the Mesozoic, and not as Paleozoic growth faults. Subsequent probable Laramide age contractional inversion of the Jurassic faults is associated with northwest-trending upright fold and reverse faults that collectively form the antiformal geometry of the Lynn-Carlin Window. Similar patterns occur in trends to the west, where the RMT is imbricated and folded by EW to ENE directed thrusts, with subsequent normal extensional collapse during mineralization, as is evident in the Twin Creeks deposit and the Cortez District.

Gold mineralization is associated with initial phases of northwest-southeast Eocene extensional collapse of the folded and thickened crust of the region, during development of the Ruby Mountains Metamorphic Complex. Extension was focused locally by the structural highs formed by the Mesozoic contractional episodes, obliquely mobilizing older reverse faults and northwest trending inverted Jurassic faults, and also causing the development of new north-northeast trending extensional faults. Collectively, these structures form upward converging permeable networks beneath the capping RMT that trapped Eocene Au-bearing fluids which were channeled along steeper faults, focused in fold hinges, and which overlapped with Eocene magmatism.

Although having some differences in ore style and no apparent association with nearby magmatism, Carlin-like deposits of southern China within Guizhou Province also have structural controls dominated by polyphase fold-thrust geometry, and late syn-mineralization extension. At the Jinfeng deposit, two orthogonal fold-thrust phases were separated by a major period of extensional faulting, which generated major intra-contractional extensional faults that were remobilized by the second folding event. Mineralization occurred during post-orogenic collapse and normal inversion of the contractional architecture, focused around the intra-orogenic

extensional fault system. The similarities in structural history, relative timing to deformation and geometry to the Great Basin Nevada underscore the importance of the inherited contractional architecture on deposit localization. With similar host rocks, these common histories and processes may explain many of the similarities between the deposits in Nevada and China, despite having potentially different genetic sources.