Toward a global Carlin-type gold exploration model

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ABSTRACT (USE 'HEADING 1' STYLE)

Nevada hails as the pre-eminent camp for sediment-hosted gold deposits, yet uncertainty in the age and regional processes responsible for its giant Au-only deposits have contributed to less effectual exploration models beyond its bounds. We assess recent findings that contribute toward developing a Carlin-type deposit (CTD) model from an explorer's perspective beginning with the age of deposits in Nevada, which was long controversial but now is firmly established as Eocene and short-lived, with deposits having formed over only a ~4 Ma period. Second, CTDs are coeval and co-spatial with other major gold-dominated deposits, including gold skarn and hornfels-associated distal-disseminated gold deposits. CTDs themselves formed at shallow depths and low temperature, and some newly recognized deposits formed at or very near the paleosurface. Third, all deposits are spatially and temporally linked with a distinct pulse of continental arc magmatism, yet major CTDs are concentrated along the west edge of the arc, whereas the east half contains numerous porphyry copper-related deposits, including giant Bingham Canyon. All sediment-hosted gold deposits from skarn to near surface are argued to represent a gold-dominant metallogeny that is broadly related to Eocene arc magmatism. However, CTD metallogeny differs importantly from a classic continental arc-related magmatic-hydrothermal metallogeny in several important ways. For example, sediment-hosted gold deposits reflect demonstrably reduced mineral assemblages that span high- to low-temperature deposits. High-temperature deposits are associated with porphyry intrusions, (<2-km diameter), but low-temperature CTDs are distal and constitute large structurally complex camps or belts that are regional in scale (10s to 100s kms length). Here, we present regional data bearing on the nature of hydrothermal fluids associated with arc magmatism and place CTDs into context with more 'conventional' copper-rich magmatic-hydrothermal systems. Recognition of a distinct CTD metallogeny beyond the Great Basin may help to explain some copper-poor continental arcs globally.