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Morphotextural and Chemical Analysis of Proximal Gold Placers and Epithermal Primary Sources: the Serra Dourada – Bananal Deposit (Aguapeí Belt, Brazil)

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Understanding the evolution of gold geochemistry and morphology after its liberation from lode into alluvial systems, is critical to define efficient prospection strategies. Most morphological changes occur in the short range (transport distances <5km), but the chemical evolution is unclear. We have investigated those features in gold particles from the Bananal proximal placer (BP), and Serra Dourada (SD) epithermal deposit. Primary gold (SD) is formed by monocrystals and polycrystals with sizes between 1.3 and 11.75 mm, octahedra habit and, sometimes, hopped growth. Placer gold (BP) nuggets range between 1.95 and 6.95 mm, and only 17% of them preserve clear primary morphologies (MG1). Most of placer nuggets (83%) exhibits mechanically reworked shapes (MG2), with mean CFI, CSF and Shilo indexes of 2.40, 0.46 and 1.41. The distribution of morphological populations is compatible with data from other proximal placers (< 5km transport range). Textural and geochemical results show primary crystals (SD) are homogeneous Au:Ag alloys (Au1 £0.1% wt% Ag), without mineral inclusions, and no development of supergene Au-rich rim. About 12% of placer nuggets are chemically and morphologically equivalent to primary crystals (Au1 £ 0.6% wt% Ag). In this group the formation of a compositional rim is connected to the morphological evolution during transport. However most of placer particles (>80%) has a distinct geochemical signature: ternary alloys (Au:Ag:Cu) in the core (Au1), and mineral inclusions (Quartz, Pyrite, Cobaltite-gersdorffite). Interestingly, this last group shows no evident morphological signature but general MG2 ones. Our data point to Serra Dourada -Bananal deposits are genetically and spatially connected, and represent the evolution of an epithermal HS system in which a primary geochemical zoning exists. Erosion level, and colluvial-to-alluvial sedimentary context, were responsible of the morpho-chemical mixture founded in the Bananal placer.