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Primary and Secondary Gold Sources of Quaternary Placers of Western Spain: a Morphotextural and Compositional Analysis of the Fresnedoso Deposit.

Kelvin Dos Santos Alves[1], Santos Barrios Sánchez[1], Juan Gómez Barreiro[1], Raul Merinero Palomares[2], Rafael Pablo Lozano Fernández[3], and José Manuel Compaña Prieto[4]

[1]Departamento de Geología. Facultad de Ciencias, Universidad de Salamanca, Pza. de Los Caídos s/n, 37008 Salamanca, Spain (kelvindossantos@usal.es)

[2]Departamento de Petrología y Mineralogía de la Universidad Complutense de Madrid, Avda. Complutense s/n, 28040 Madrid, Spain

[3]Museo Geominero, Instituto Geológico y Minero de España C/ Ríos Rosas, nº 23 28003 Madrid

[4]Servicio de Difracción de Rayos-X, Universidad de Salamanca, Pza. de Los Caídos s/n, 37008 Salamanca, Spain

In this contribution we have investigated the Fresnedoso Quaternary gold placer (Western Spain), analyzing the morphotextural and microchemical evolution of gold particles. The statistical analysis has revealed the presence of two populations of particles being consistent with primary sources situated at a distal [20 - 50 km] and a proximal [2.5 - 10 km] range. The gold morphology and chemistry point to a recycling (and potentially undiscovered) Tertiary paleoplacers. The discovery of primary laminar morphologies points to lode deposits in small-flat veins hosted in Precambrian metasediments (Schist Greywacke Complex). All these findings suggest that the Fresnedoso gold deposit is formed by mono and polycyclic particles. We have tested previous transport distance vs Flattening indexes (CFI, Shilo) models resulting in useful framework for exploration of undiscovered ores, even with a small sample dimension. Chemical analysis of the different gold morphologies depicted that the Fresnedoso gold is a AuAg bimetallic alloy. Three groups were identified based on the texture and composition of the gold particles: Type 1 (Au1= Au89-94Ag11-6), Type 2 (Au2= Au99 Ag1) and Type 3 (Au3~ Au >99). Particle's cores (gold Type 1) show a compositional range that could be interpreted as differences in primary sources, spatial dispersion of sources or the actuation of secondary processes, probably in an orogenic gold context. Microchemical heterogeneity in the particles is probably due to secondary processes. A conceptual model has been elaborated to explain particle's microchemical domains represented by gold Type 2 (rim) and Type 3 (micro-aggregates) as the result of two different de-alloying stages: A) initial Ag-leaching at the rim and/or through microcracks and grainboundaries (Type 2), B) Total reset of the primary chemical fingerprint, with porous microtexture and the precipitation of gold with iron oxyhydroxides and clays (Type 3). This model suggests a silver de-alloying mechanism favored in a chlorine-iron-rich environment as in the case of laterites. Deformation and eventually recrystallization mechanisms associated with the fluvial transport (mechanical cold-work), cooperated in the evolution of the particles (Dos Santos et al. 2020).

References

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