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Rethinking Fresnillo, Mexico - the World's Premier Primary Silver Camp

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The Fresnillo District has generated 3.3 billion ounces of silver in production plus resources since the 1553 discovery of vein outcrops on Cerro Proaño, a prominent hill surrounded for kilometers by largely covered ground. Through 400 years of mining these low to intermediate sulfidation veins were traced 1200 m vertically through mantos to skarns and an intrusion. This led to modeling Cerro Proaño as the district's center - the orefluid upwelling zone from which all district mineralization stemmed.

However, post-1997 discoveries of major veins reveal structural, igneous, mineralization composition, mineralization zoning, and alteration features inconsistent with a single source. Most notably, the Valdecañas Vein (8 km from Cerro Proano) clearly marks an independent orefluid upwelling zone and both the San Carlos and Santa Rita veins share many comparable features. Today we recognize four separate vein swarms that overlap slightly in space, and probably time. Each swarm shows discrete compositional characteristics and one vein in each swarm shows distinctive features indicating that they were the principal "feeder" channel through which orefluids rose from depth and migrated laterally into satellite veins. These new data show that the district is best considered a sustained, evolving system where the loci of mineralization shifted in space over time. Temporal shifts have been documented in Hot Springs systems, but we lack age dating to determine if Fresnillo mineralization centers were active sequentially or simultaneously.

This reevaluation reveals overlooked exploration opportunities. For the Fresnillo district, seeking repetitions of distinctive high-level alteration features should lead to recognition of additional vein swarms, starting with the feeder vein for each swarm. More globally, reevaluating other epithermal vein camps for multiple shifting orefluid upwelling centers could lead to significant discoveries in bypassed, covered or unexpected parts of these systems.