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Gold fingerprint of the SCLM beneath a metallogenic province

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Magmatic-hydrothermal gold deposits form clusters in the Earth's crust and are heterogeneously distributed within lithospheric blocks. A global assessment of whole-rock gold abundances in mantle lithologies worldwide indicates that Au concentrations increase with increasing fertility of mantle peridotites, with median Au contents ranging from 0.50 ppb in dunites, 1.00 ppb in harzburgites, and up to 1.26 ppb in lherzolites. Of particular interest are those volumes of fertile Subcontinental Lithospheric Mantle (SCLM) veined by pyroxenites and wehrlites, usually the Au-richest lithologies in the mantle as they have 2.05 ppb median Au concentrations. Partial melting of SCLM domains endowed in gold seems to play a key role in the genesis of gold-enriched magmas parental to magmatic-hydrothermal gold deposits in continental arc settings. The mineralogical expressions of gold inventory in such fertile mantle rocks are accessory Ni-Fe-Cu sulfides and discrete micron-to-nano-sized Au mineral particles that control the extraction and transport of gold in the mantle. Mantle xenoliths from the Neogene Volcanic Province (NVP) of southeast Spain represent an excellent example of SCLM refertilized by gold-sulfide-rich silicate melts underlying a gold metallogenic province. Here we present mineralogical and compositional data of sulfides in mantle xenoliths from this area (Tallante volcanic center), which are anomalously rich in gold (up to 46 ppm) compared to sulfides from SCLM not associated with Au-metallogenic provinces. We propose that these gold-rich, fertile mantle sources may have melted during the Cenozoic evolution of the westernmost Mediterranean subduction system and fed the ore-productive volcanic activity in southeast Spain.