

*SHEAR ZONE-HOSTED POLYMETALLIC SULFIDES IN THE SOUTH LIMOUSIN AREA,
MASSIF CENTRAL, FRANCE: REMOBILIZED SULFIDE DEPOSITS RELATED TO
VARISCAN COLLISIONAL TECTONICS AND AMPHIBOLITE FACIES METAMORPHISM*

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Abstract

This paper investigates the relationship between deformation and mineralization developed in amphibolite facies shear zones in the south Limousin area using structural, microstructural, and textural analyses. The investigated shear zone is a ductile thrust fault that stacked low-grade metamorphic rocks onto a highly metamorphosed basement, with both being folded during a late orogenic tectonic phase. The shear zone hosts sulfide-bearing mylonitic quartzites composed of dynamically recrystallized quartz, syntectonic pyrite, pyrrhotite, sphalerite, chalcopyrite, and late covellite. Mylonites display northwest-southeast-trending lineation and asymmetric microstructures, including sigmoidal quartz aggregates and shear bands, that indicate a northwestward movement along the shear zone. Sulfides occur mainly along shear bands and exhibit primary, undeformed textures, attesting to their syntectonic emplacement. Based on petrographic analyses of the metamorphic host rocks, mineralization formed at $P = 5.0$ to 5.5 kbars, and $T = \sim 300^\circ$ to 600°C , consistent with P-T conditions for recrystallization of metapelites and metabasites involved in the shear zone. All data indicate that ductile deformation and emplacement of mineralization were coeval. The occurrence of similar pre-tectonic sulfide deposits in the hanging wall of the mineralized shear zone suggests that the sulfides in the thrust fault were remobilized from preexisting mineralization by fluid that migrated toward the thrust. This is the first evidence for thrust zone-hosted mineralization within the Massif Central and attests to the role of crustal-scale thrust faults as occasional pathways for mineralized fluids during the upper Paleozoic continental collision. These results suggest that ductile thrust faults may be important sites of ore deposition in the Variscan belt of western Europe and in similar collisional belts elsewhere.

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